SERVICE MANUAL

EMISSION CONTROL SYSTEM

FOR 1972 YEAR MODELS

REVISED EDITION

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

EMISSION
CONTROL SYSTEMS

SERVICE MANUAL

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

QUICK REFERENCE INDEX

A12 ENGINE A12

L16 ENGINE L16

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SERVICE EQUIPMENT ..... SE

FOREWORD

This service manual has been prepared for the purpose of assisting the service personnel of our distributors and dealers in providing effective service and maintenance of all Datsun vehicle's Emission Control Systems

Since proper maintenance and service are most essential to satisfy the Federal and California Air Pollution Control Standards by keeping vehicles in the best possible condition this manual should be carefully studied The following matters should be noted for effective utilization of this manual

1 Also refer to the following SERVICE MANUALS for complete details of the engines, because this manual gives information concerning the Emission Control System only

- A10 and A12 ENGINE
- L13, L16 and L20 ENGINE
- L20A and L24 ENGINE

2. All part names in this manual conform to PARTS CATALOG of each vehicle, and only the genuine service parts listed in this PARTS CATALOG must be used for replacement

3. All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication approval.

4 It should be emphasized that those who use this manual are responsible for revising the contents according to the SERVICE JOURNAL and SERVICE DATA AND SPECIFICATIONS issued by the factory, which carry the latest factory approved servicing methods

5 Rights for alteration of specifications and methods at any time are reserved

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SECTION A12

A12

A12 ENGINE

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A12 ENGINE

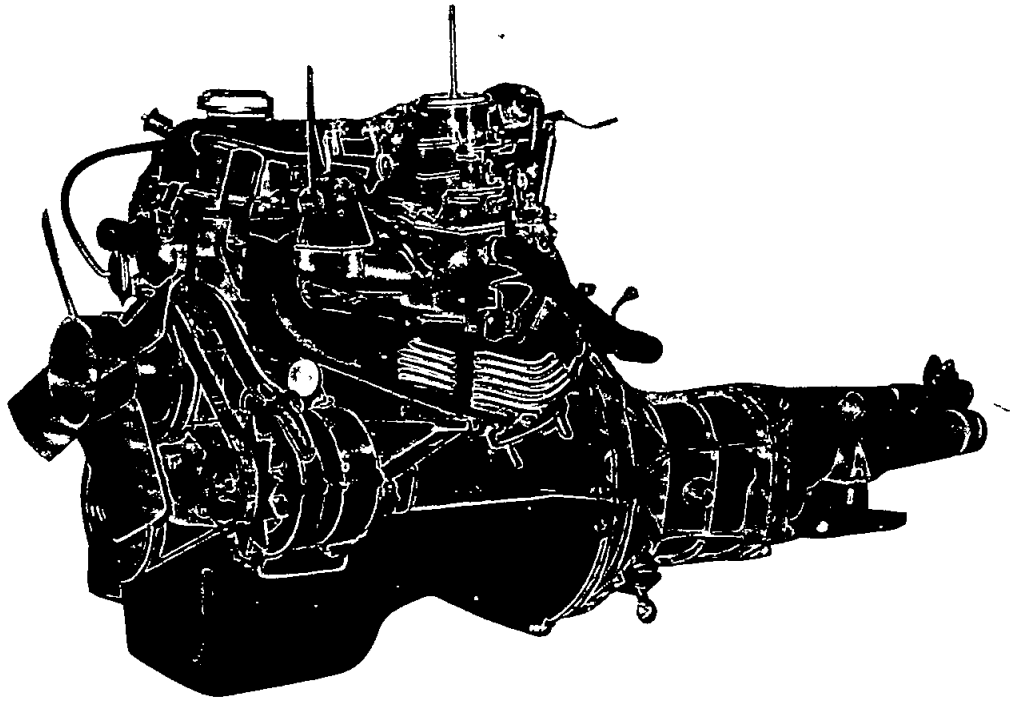


Fig. EC-1 Front side external view

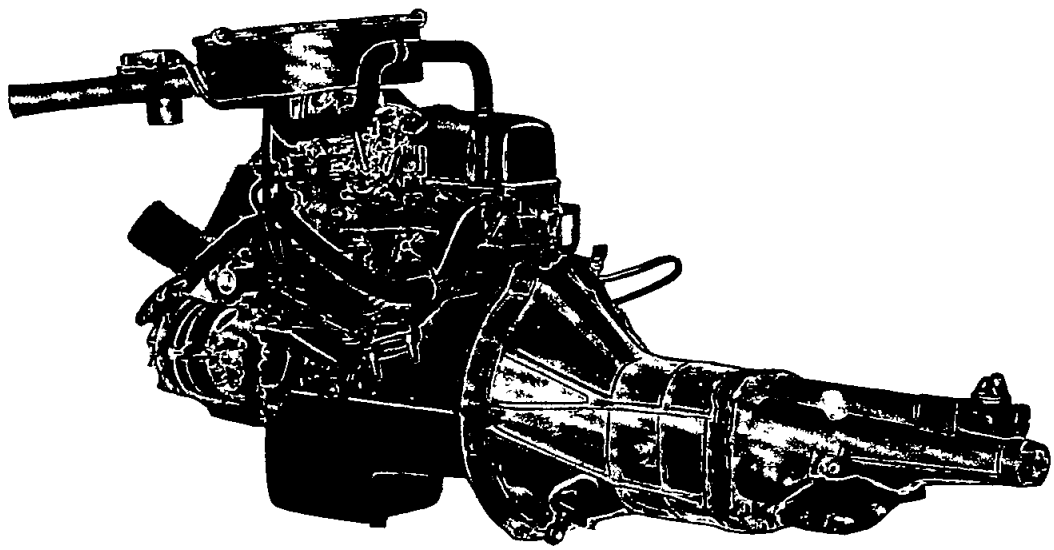


Fig EC-2 Rear side external view

GENERAL DESCRIPTION

There are three types of control system These are,

1 Crankcase emission control system
2 Exhaust emission control system
3 Evaporative emission control system

Periodic inspection and required servicing of these systems should be carried out at the recommended intervals to reduce harmful emissions to a minimum

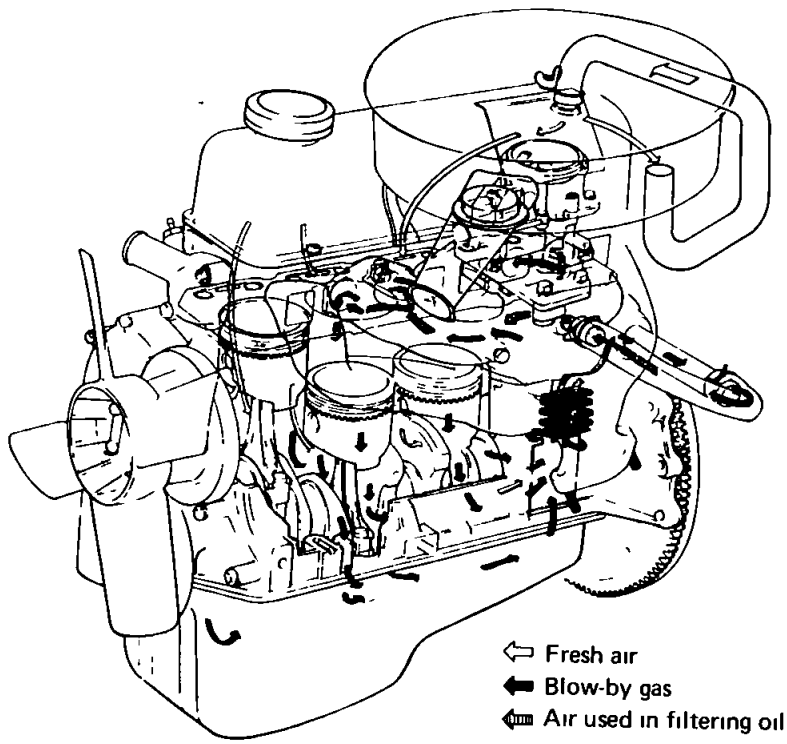
CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

This system returns blow-by gas to both the intake manifold and carburetor air cleaner

The ventilation control valve is provided to conduct crankcase blow-by gas to the intake manifold During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the valve Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air The ventilating air is then drawn from the clean side of the carburetor air cleaner, through the tube connecting carburetor air cleaner to rocker cover, into the crankcase

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the tube connection in the reverse direction In vehicles with an excessively high blow-by some of the flow will go through the tube connection to the carburetor air cleaner under all operating conditions



EC001

Fig EC-3 Crankcase emission control system (at partially throttle open)

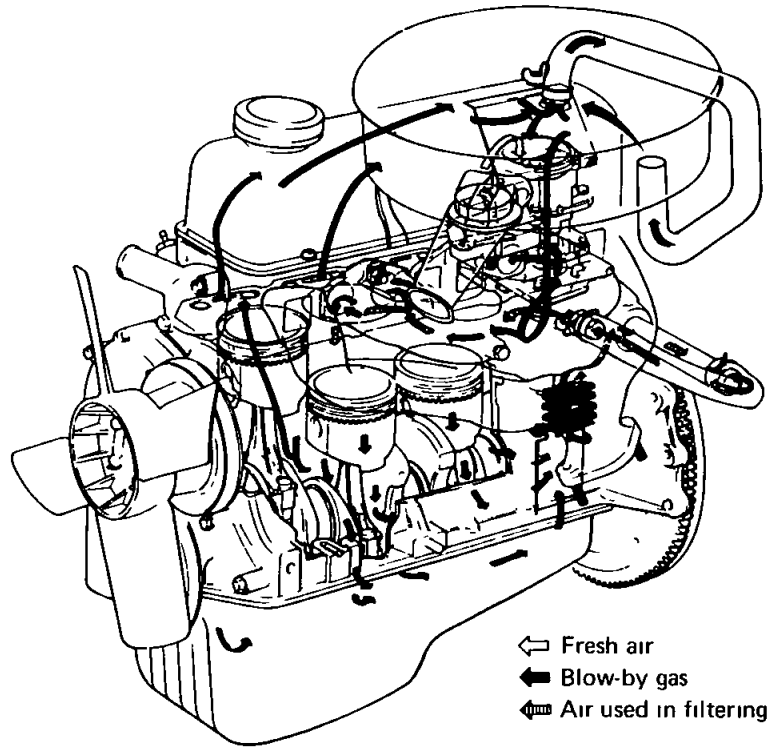


Fig EC-4 Crankcase emission control system (at full throttle open)

EXHAUST EMISSION CONTROL SYSTEM

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ELECTRIC AUTOMATIC CHOKE	EC-8	THROTTLE OPENER	EC-9

DESCRIPTION

The 1972 model A12 engine employs the "Engine Modification System" consisting essentially of the following units

1 Combustion chambers (Modified configuration)
2 Transmission-controlled vacuum advance (for Manual Transmission model only)
3 Automatic temperature control air cleaner
4 Leaner carburetor with an electric automatic choke
5 Throttle opener

TRANSMISSION -CONTROLLED VACUUM ADVANCE

This system provides the vacuum advance only when the gear is in the top (4th) position, and retarded spark timing (with no vacuum advance) at other positions for complete combustion

This system, however, allows vacuum advance during the warming-up period of engine in cold weather, and provides satisfactory driving performance immediately after starting the engine

Gear	Vacuum advance
R	No
1st	No
2nd	No
3rd	No
4th	YES

Note Immediately after starting the engine in cold weather, vacuum advance is allowed for all gear positions

Operation

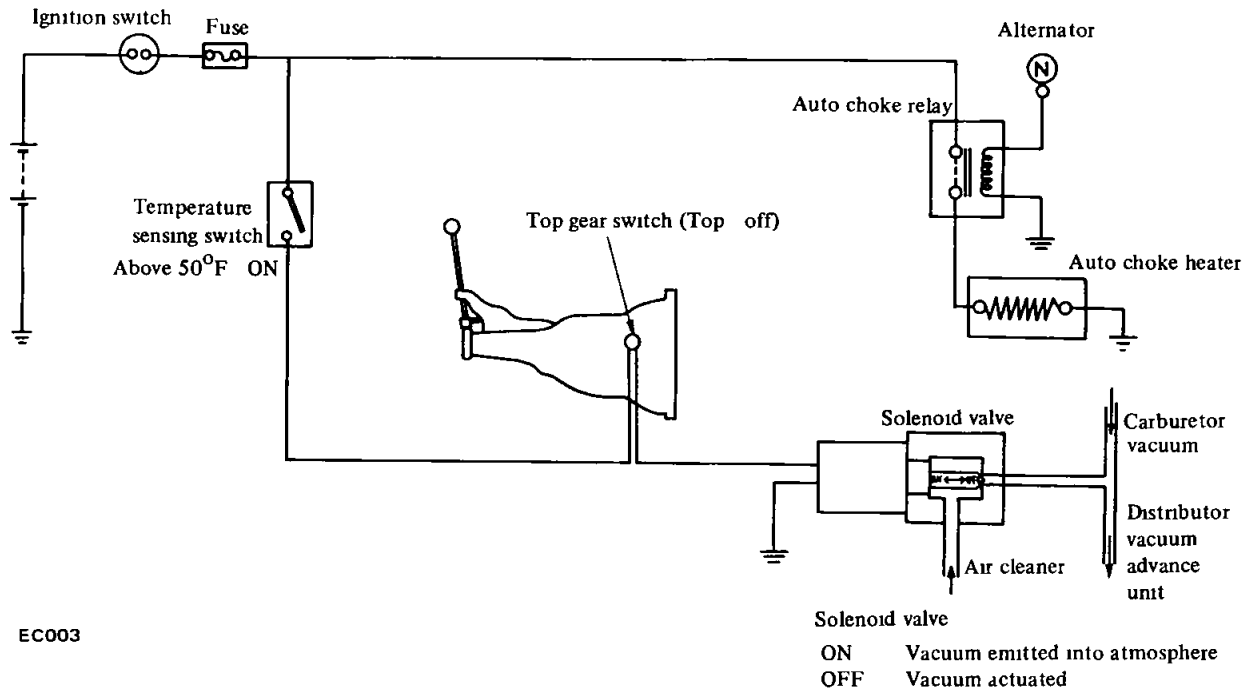


Fig EC-5 Schematic drawing of control system for A12 engine

When electric current flows through the solenoid valve, the needle valve opens and introduces air from the air cleaner into the vacuum advance unit of the distributor through the vacuum hose, and the vacuum advance is eliminated When the solenoid valve is deenergized, the needle valve closes and the vacuum created by the carburetor is introduced into the vacuum advance unit of the distributor to provide usual vacuum advance

The gear switch, located on the transmission case, operates so as to interrupt the flow of electric current when the gear is placed into "Top," but allows it to flow in other gear positions

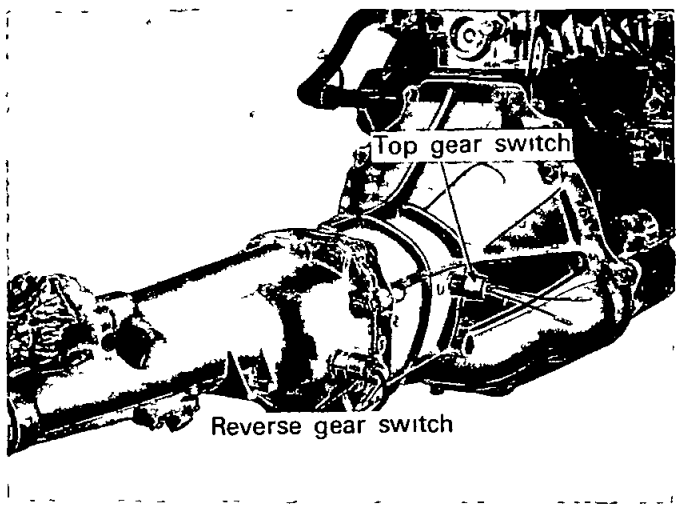


Fig EC-6 Gear switch installation

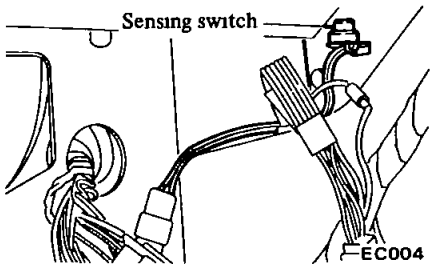
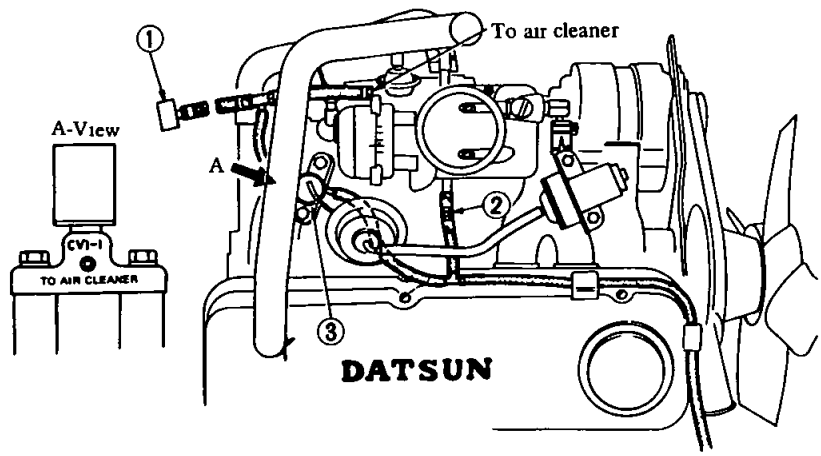


Fig EC-7 Temperature sensing switch installation

The temperature sensing switch is screwed on the dash side panel (RH) The bi-metal located in the temperature sensing switch prevents the flow of electric current when the temperature is below 50°F, and thus ensures a proper running performance immediately after starting the engine in cold weather

An orifice is employed in the vacuum hose connecting the carburetor and tee to restrict the air flow bypassing the carburetor when air is freely introduced through the vacuum hose

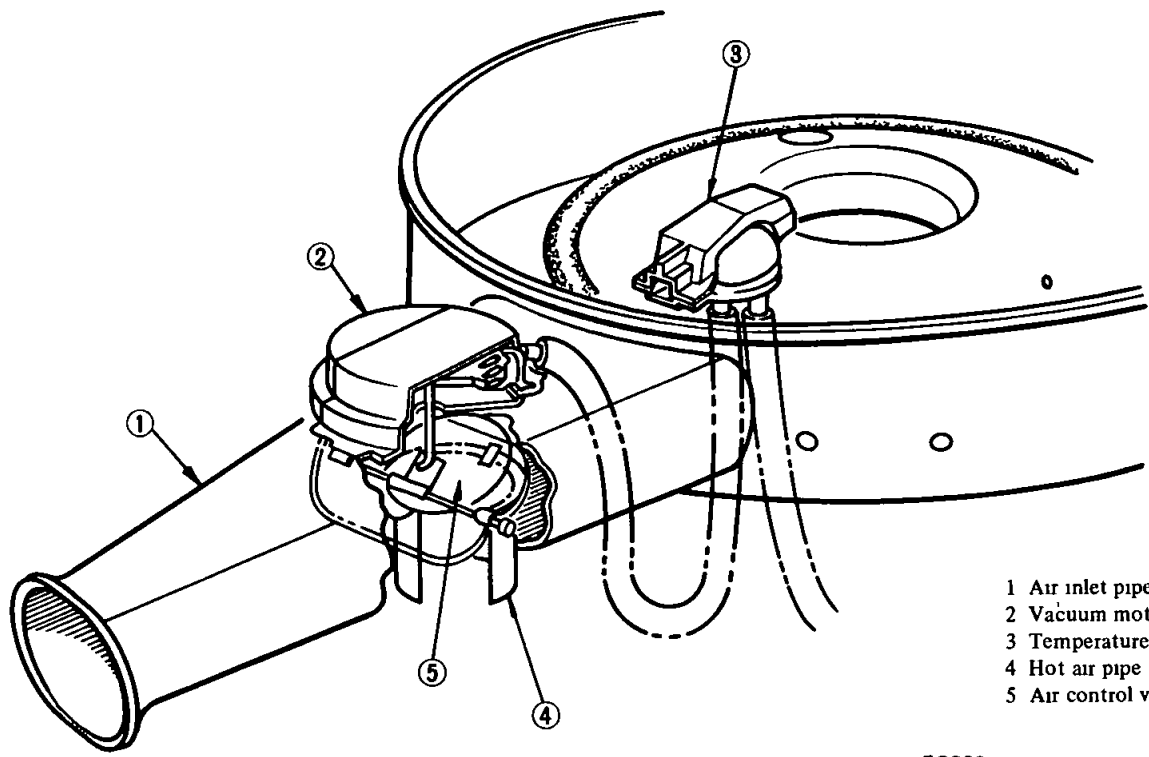


1 Flow guide valve
2 Orifice
3 Solenoid valve assembly

Fig EC-8 Vacuum tube diagram

AUTOMATIC TEMPERATURE CONTROL AIR CLEANER

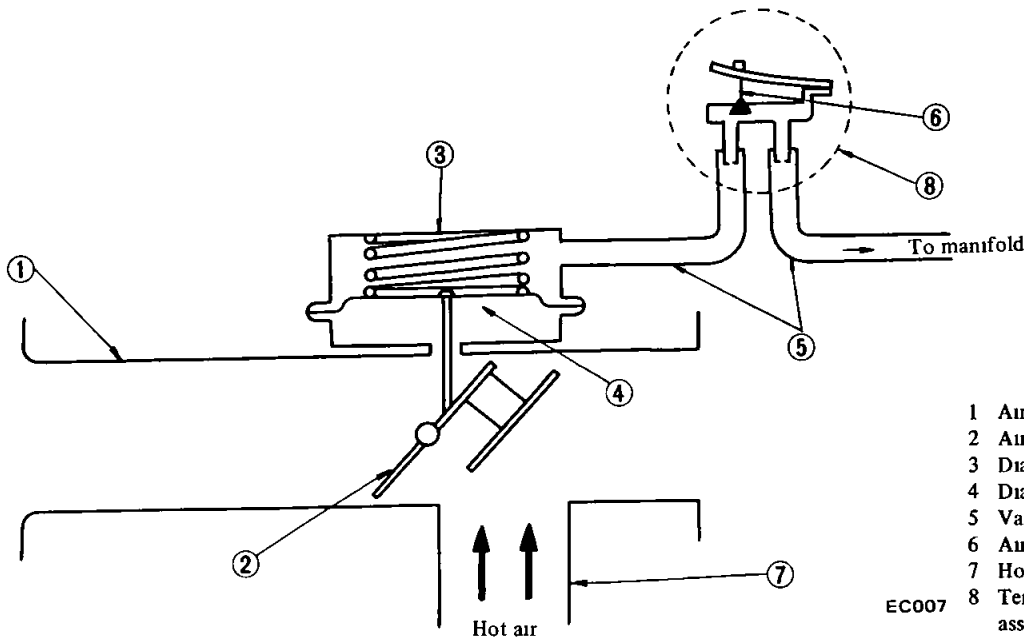
The automatic temperature control air cleaner is of a special type equipped with a temperature sensor and vacuum-operated valve The vacuum acting on the air control valve is controlled by the temperature sensor (See Figure EC-9)



1 Air inlet pipe
2 Vacuum motor assembly
3 Temperature sensor assembly
4 Hot air pipe
5 Air control valve

Fig EC-9 Automatic temperature control air cleaner

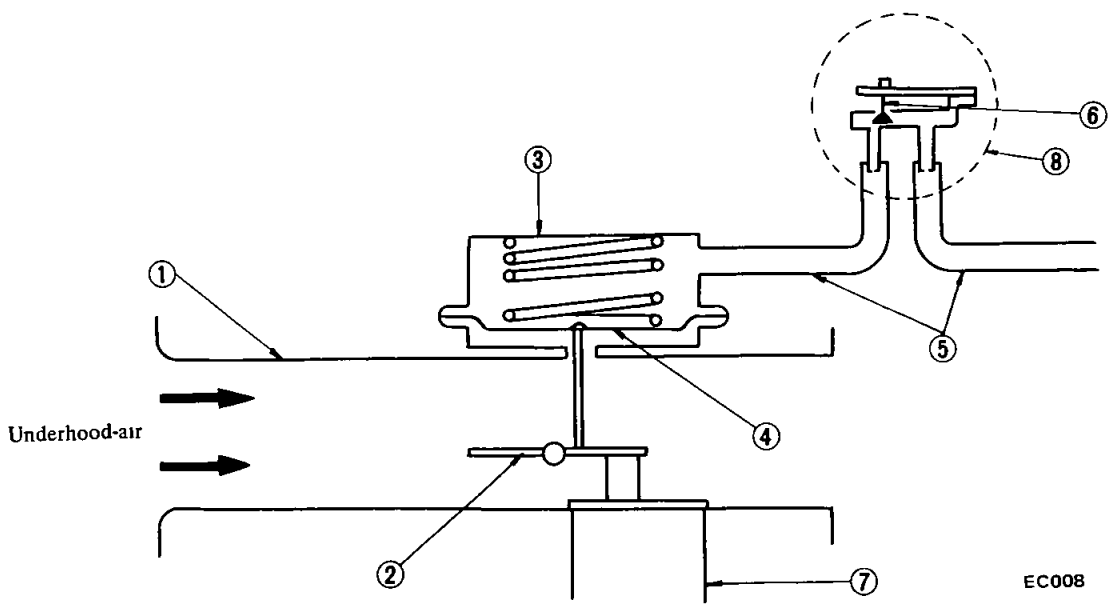
If the temperature of suction air is low when the engine is running, the valve closes the underhood-air inlet, and introduces hot air through the cover which is installed on the exhaust manifold (See Figure EC-10)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hoses
6 Air bleed valve (closed)
7 Hot air pipe
8 Temperature sensor assembly

Fig EC-10 Hot-air delivery mode (During cold engine operation)

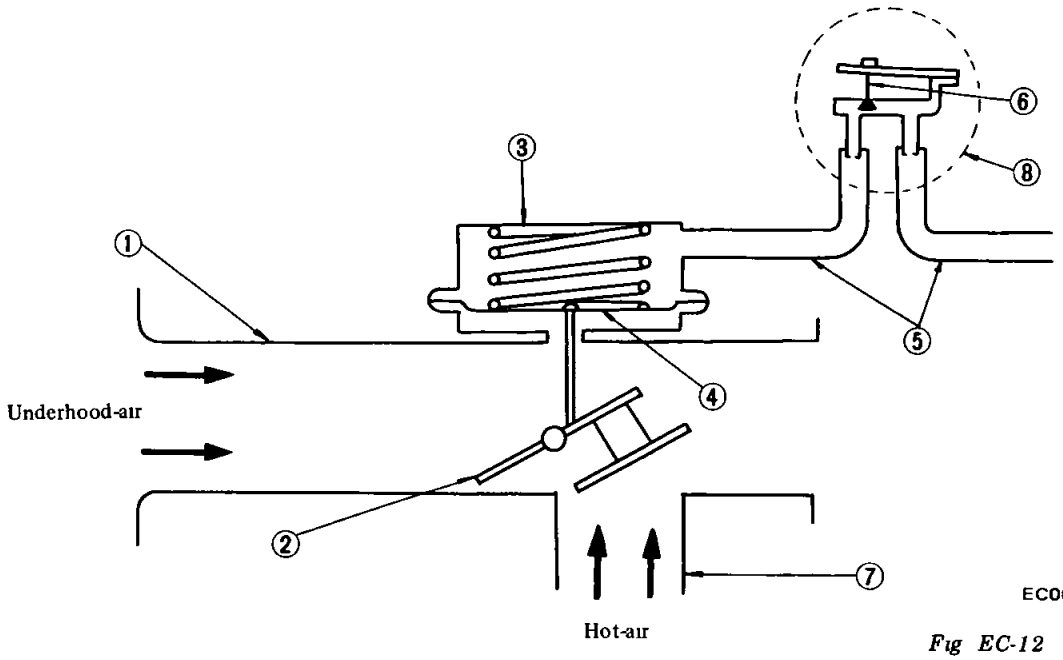
When the temperature of suction air around the sensor reaches 110°F or above, the sensor actuates to open the valve When the temperature of suction air around the sensor further rises and reaches above 120°F, the valve completely opens to prevent the entrance of hot air, and allows underhood-air alone to be introduced into the carburetor (See Figure EC-11)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hoses
6 Air bleed valve (fully open)
7 Hot air pipe
8 Temperature sensor assembly

Fig EC-11 Underhood-air delivery mode (During hot engine operation)

The valve acts in the manner described previously, and the temperature of suction air around the sensor is always kept at about 110°F (See Figure EC-12)



1 Air inlet pipe
2 Air control valve
3 Diaphragm spring
4 Diaphragm
5 Vacuum hoses
6 Air bleed valve (partially open)
7 Hot air pipe
8 Temperature sensor assembly

Fig EC-12 Regulating air delivery mode

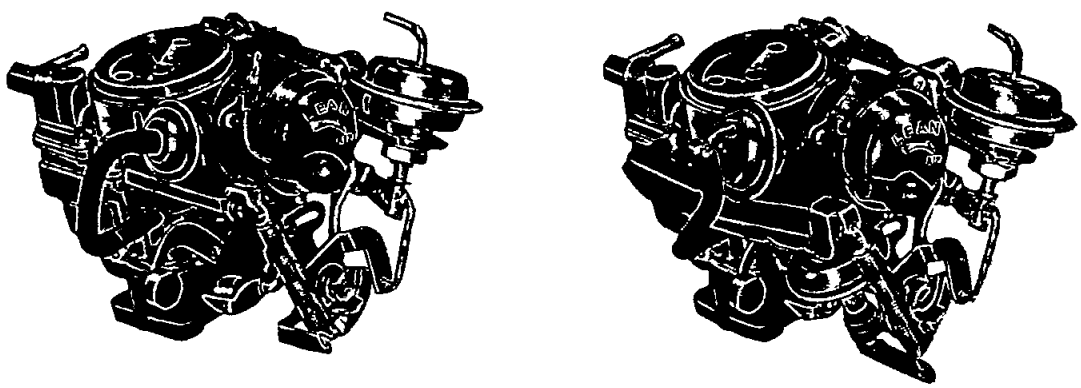
When the engine is operating under heavy load, the valve fully opens the underhood-air inlet to obtain full power regardless of the temperature around sensor

This control of carburetor air temperatures allows leaner carburetor calibration with accompanying reduced emissions than conventional controls and also eliminates carburetor icing

ELECTRIC AUTOMATIC CHOKE

An electric heater warms a bimetal interconnected to the choke valve, and controls the position of choke valve and throttle valve in accordance with the elapse of time, or the warm-up condition of engine

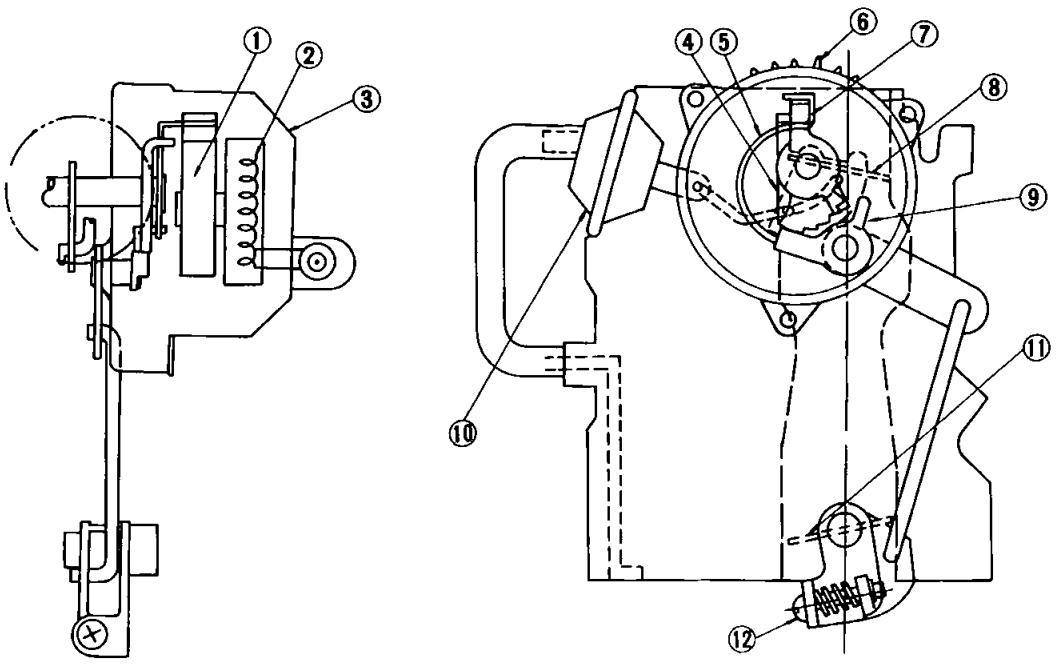
The construction and function of each part of this carburetor are as follows (See Figure EC-14)



B110 equipped with M/T

B110 equipped with A/T

Fig EC-13



1 Bi-metal
2 Heater
3 Bi-metal cover
4 Fast idle cam
5 Bi-metal
6 Bi-metal index mark
7 Choke shaft lever
8 Choke valve
9 Unloader tongue
10 Vacuum diaphragm
11 Throttle valve
12 Fast idle adjusting screw

Fig EC-14 Construction of electric automatic choke

Bi-metal and heater

Electric current flows through the heater as the engine starts, and warms bi-metal (See Figure EC-5) The deflection of bi-metal is transmitted to the choke valve through the choke valve lever

Fast idle cam

The fast idle cam determines the opening of throttle valve so as to obtain proper amount of mixture corresponding to the opening of the choke valve which depends upon the warmed-up condition of the engine

Fast idle adjusting screw

This screw adjusts the opening of the throttle valve of fast idle cam

Unloader

When accelerating the vehicle during the warm-up period, that is, before the choke valve does not sufficiently open, this unloader makes the choke valve open to a certain extent so as to obtain an adequate air-fuel mixture

Vacuum diaphragm

The moment when engine is ready to start by cranking, this diaphragm forces open choke valve to the predetermined extent so as to provide necessary amount of air-fuel mixture

Bi-metal index mark

The bi-metal index mark is used for setting the moment of the bi-metal which controls the mixing ratio required for starting the engine

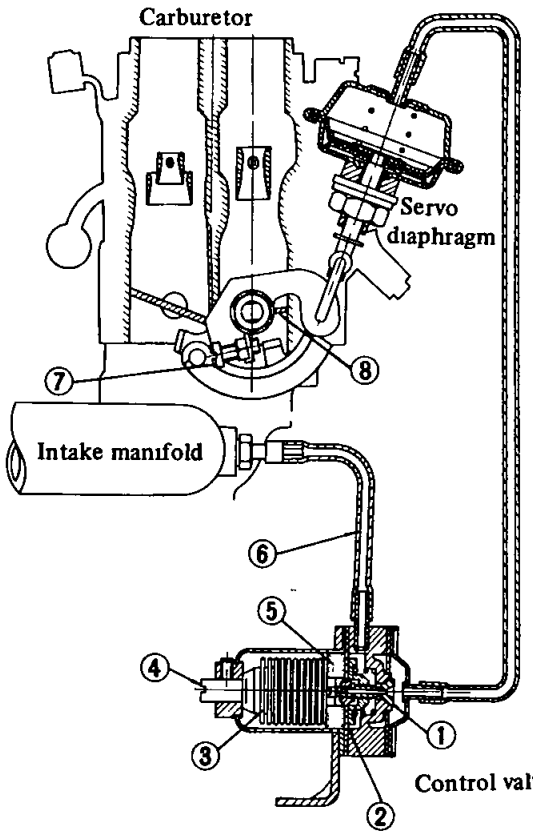
THROTTLE OPENER

The function of the throttle opener is to open the throttle valve of carburetor slightly in vehicle coasting condition During deceleration, manifold vacuum rises and a quantity of mixture in the engine is not sufficient so that a normal combustion can not continue, and a great amount of unburned HC is emitted The carburetor equipped with the throttle opener supplies the engine with an adequate charge of combustible mixture to keep proper combustion during deceleration, resulting in remarkable reduction of HC emission

The operation of the throttle opener is as follows A schematic drawing of the system is shown in Figure EC-15 At the moment when the manifold vacuum increases as occurs upon deceleration, the control valve opens to transfer the manifold vacuum to the servo diaphragm chamber and the throttle valve of the carburetor opens slightly As the vehicle speed decreases, the manifold vacuum lowers to the predetermined value The control valve begins to close gradually, keeping the manifold vacuum at the predetermined constant value

As a result, both low HC emission and normal engine brake during deceleration are obtained

The altitude corrector is provided with a slight preload to compensate the variation of the atmospheric pressure.

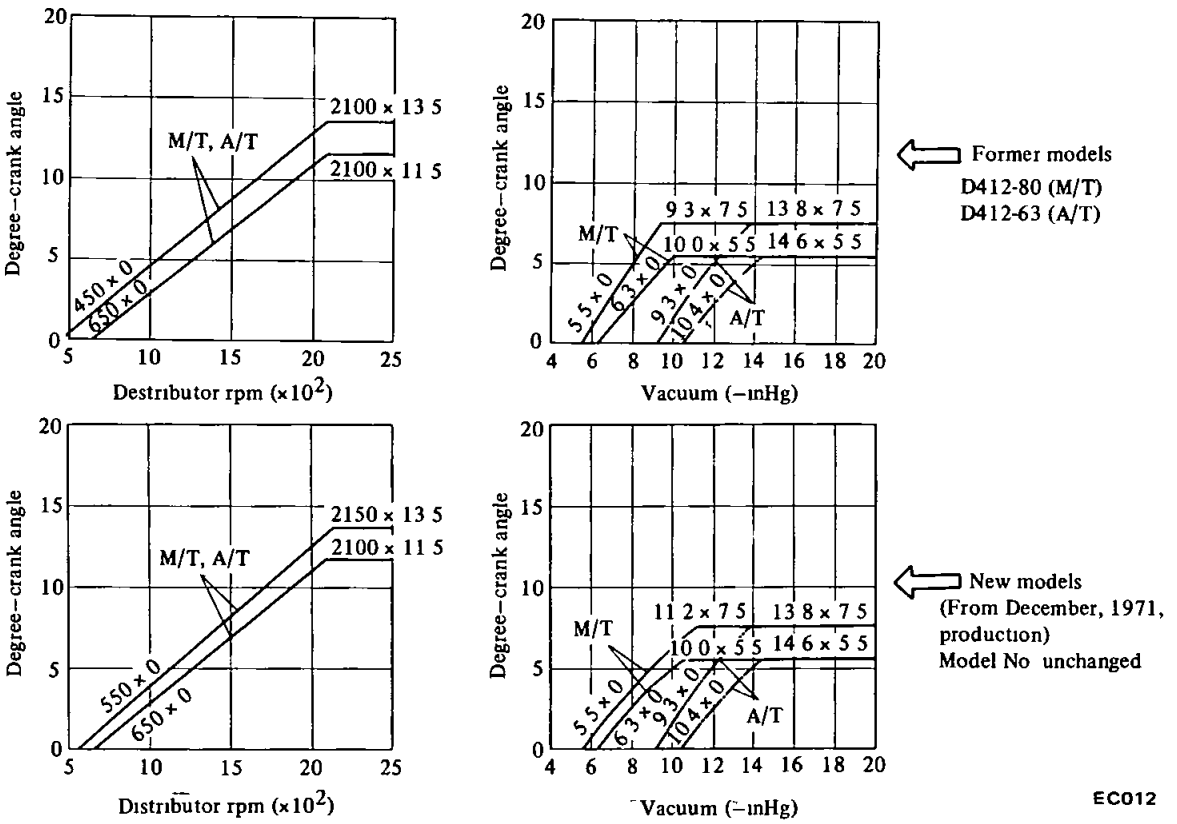


1 Valve
2 Diaphragm
3 Altitude corrector
4 Vacuum adjusting screw
5 Filter
6 Manifold vacuum tube
7 Adjusting screw
8 Primary throttle valve

EC011

Fig EC-15 Throttle opener control system

DISTRIBUTOR ADVANCE CHARACTERISTICS



EC012

Fig EC-16 Distributor advance characteristics

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION EC-11 FLOW GUIDE VALVE EC-12

DESCRIPTION

This system consists of four basic elements indicated below

1 Fuel tank with positive sealing filler cap
2 Vapor-liquid separator
3 Vapor vent line
4 Flow guide valve

The flow guide valve prevents blow-by gas from flowing into the fuel tank and guides fresh air into it, preventing gasoline vapor from escaping into the carburetor air cleaner

Flow guide valve operates and blow-by gas and gasoline vapor flow as follows

When the engine is not running, the vapor vent line, vapor liquid separator and fuel tank are filled with gasoline vapor produced in the sealed type fuel tank A flow guide valve opens when the gas pressure is above 0 4 inch Hg The gas passed through the flow guide valve (2) is accumulated in the crankcase Once the engine starts, the gas evaporating in the crankcase, is sucked into the manifold for combustion When the pressure of the sealed type fuel tank, vapor liquid separator and vapor vent line becomes negative by decreasing the fuel, the flow guide valve (1) opens to send fresh air from the carburetor air cleaner to the fuel tank

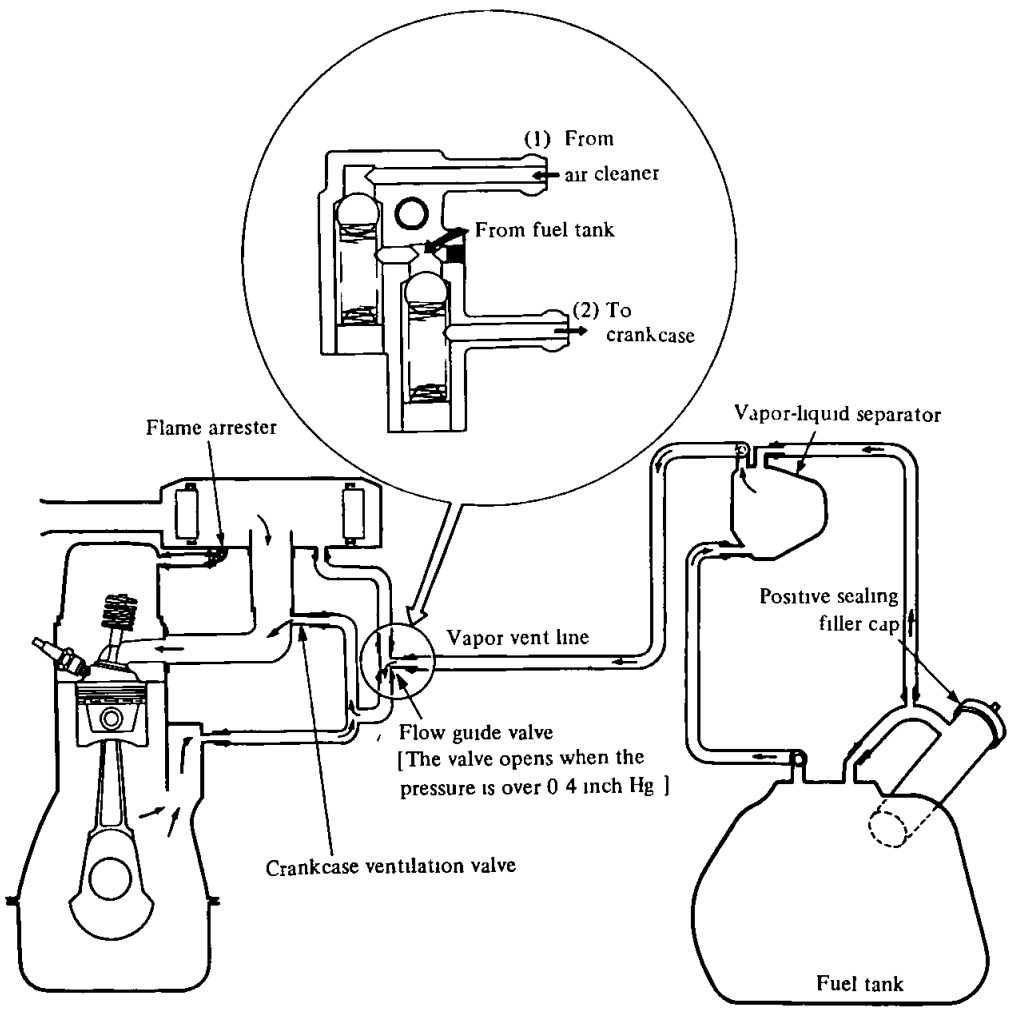


Fig EC-17 Evaporative emission control system

FLOW GUIDE VALVE

This valve is mounted in the engine compartment Marks A, F and C are engraved in the body of the valve to indicate the connection of the vapor vent line

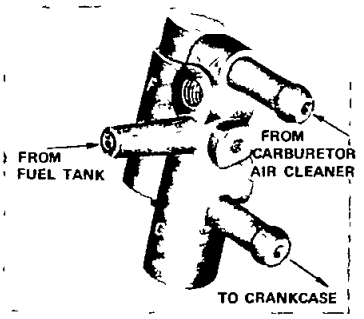


Fig EC-18 Flow guide valve

MAINTENANCE AND TESTING

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GENERAL MAINTENANCE

To make sure that exhaust emissions are maintained at a low level, it is recommended that inspection must be conducted every 12 months or every 12,000 miles Best engine operation and minimum exhaust emissions will be obtained through periodical inspections and from recommended servicing at these intervals

Carburetor

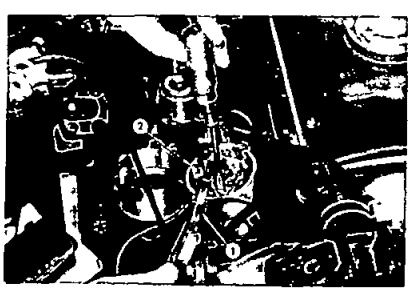
Check the choke setting and adjust to the specifications as required

Proper carburetor idle mixture adjustment is imperative for best exhaust emission control

Refer to the article given in "Adjusting ignition timing, engine idling speed and gas mixture "

Distributor

Check the distributor breaker points for abnormal pitting and wear Replace if necessary Make sure they are in correct alignment for full contact and that point dwell and gap are correct Clean and apply distributor grease to the cam and wick Breaker points should be replaced at maximum intervals of 12,000 miles



1 Thickness gauge 2 Distributor

Fig EC-19 Checking distributor breaker point gap

Spark plug

Remove and clean plugs in a sand blast cleaner Inspect each spark plug Make sure that they are of the specified heat range Inspect insulator for cracks and chips Check both center and ground electrodes If they are excessively worn, replace with new spark plugs File center electrode flat Set the gap to 0 0315 to 0 0355 inch using the proper adjusting tool Spark plug should be replaced every 12,000 miles

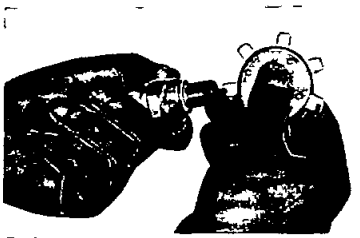


Fig EC-20 Checking spark plug point gap

High tension cable

Use an ohmmeter to check resistance on secondary cables Disconnect cables from spark plugs and remove distributor cap from distributor together with the secondary cables Do not remove cables from the cap Connect the ohmmeter between the cable terminal on the spark plug side and the corresponding electrode inside the cap

If the resistance is more than 30,000 ohms, remove the cable from the cap and check the cable resistance only If the resistance is still more than 30,000 ohms, replace the cable assembly

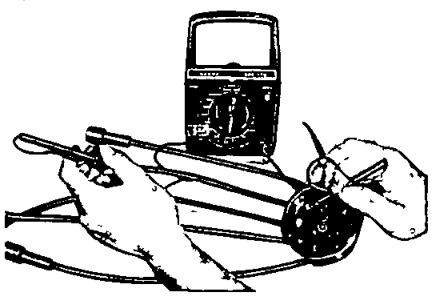


Fig EC-21 Checking high tension cables

Battery

Measure the specific gravity of electrolyte with an accurate hydrometer Specific gravity should be at least 1 220 or more Add distilled water as required to bring fluid up to proper level

Clean battery posts and cable terminals After tightening the clamps, coat the battery posts and clamps with light grease to prevent corrosion

Carburetor air cleaner element

The paper element has been specially treated (Viscous type), and therefore, no cleaning is required But it should be replaced every 24,000 miles

CRANKCASE EMISSION CONTROL SYSTEM

1 Check hoses and hose connections for leaks

2 Disconnect all hoses and blow them out with compressed air

If any hose can not be free of obstructions, replace with a new one

3 Test the crankcase ventilation control valve in accordance with the following method

With engine running at idle, remove the ventilator hose from the crankcase ventilation control valve If the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over the valve inlet If the valve is plugged, replace with a new valve Check for deposit plugging in the hose Clean if necessary

Normal control valve replacement period is every 30,000 miles

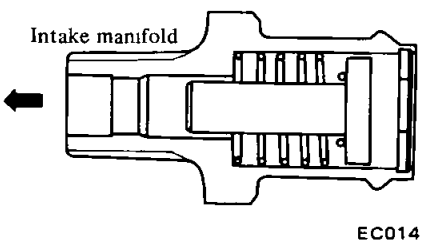


Fig EC-22 Cross-sectional view of crankcase ventilation control valve

4 Crankcase steel net

If clogged with oil slush, clean with solvent and dry with compressed air

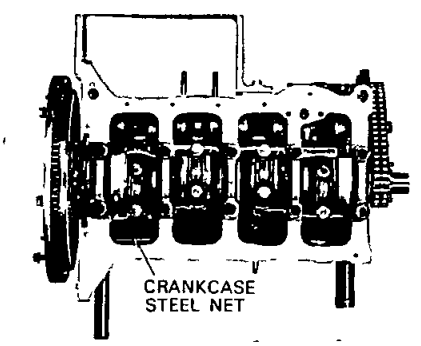


Fig EC-23 Crankcase steel net in cylinder block

EXHAUST EMISSION CONTROL SYSTEM

Throttle opener

Before adjusting the throttle opener, make sure that the engine is warmed-up and that the automatic choke blade is fully open Carefully observe the following instructions

— Manual transmission model —

Test should be conducted after solenoid vacuum valve (used on transmission controlled vacuum advance) is deenergized

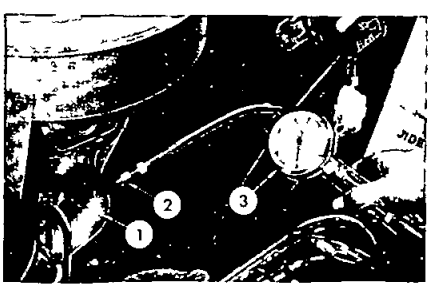
— Automatic transmission model —

Test should be conducted after the dash pot does not operate by loosening adjusting screw

Adjustment with a vacuum gauge and a tachometer

1 Install tachometer engine tester and vacuum gauge

Disconnect the tube of the automatic temperature control air cleaner and, in its vacant place, connect a vacuum tube securely Tube connector is attached to intake manifold



1 Intake manifold 3 Vacuum gauge
2 Connector

Fig EC-24 Vacuum gauge installation

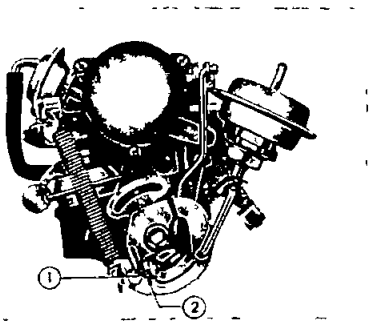
2 Connect the servo diaphragm vacuum tube directly to the intake manifold connector without laying through the control valve

3 With negative pressure (vacuum) in the intake manifold, the servo diaphragm operates, and thus, the primary throttle valve is opened When the servo diaphragm normally operates, the engine speed rises reaching 1,700 to 1,800 rpm When the engine speed does not reach this range, turn the adjusting screw properly (See Figure EC-25)

(1) When the engine speed is lower than the prescribed range, turn the adjusting screw clockwise

(2) When the engine speed is higher than the prescribed range, turn the adjusting screw counterclockwise

Upon completion of the adjustment, set the adjusting screw lock nut stationarily, and make sure that the engine speed is in the prescribed range correctly



1 Adjusting screw 2 Lock nut

Fig EC-25 Servo diaphragm adjusting screw

4 Disconnect the servo diaphragm vacuum tube from the intake manifold, and connect it to the control valve Connect the vacuum tube of the control valve to the intake manifold (normal piping)

5 The primary throttle valve is opened by the link connected to it When the engine speed is increased to approximately 3,000 rpm and lowered naturally from this speed, changes in servo diaphragm link stroke, intake manifold vacuum, and engine speed are as shown in Figure EC-26

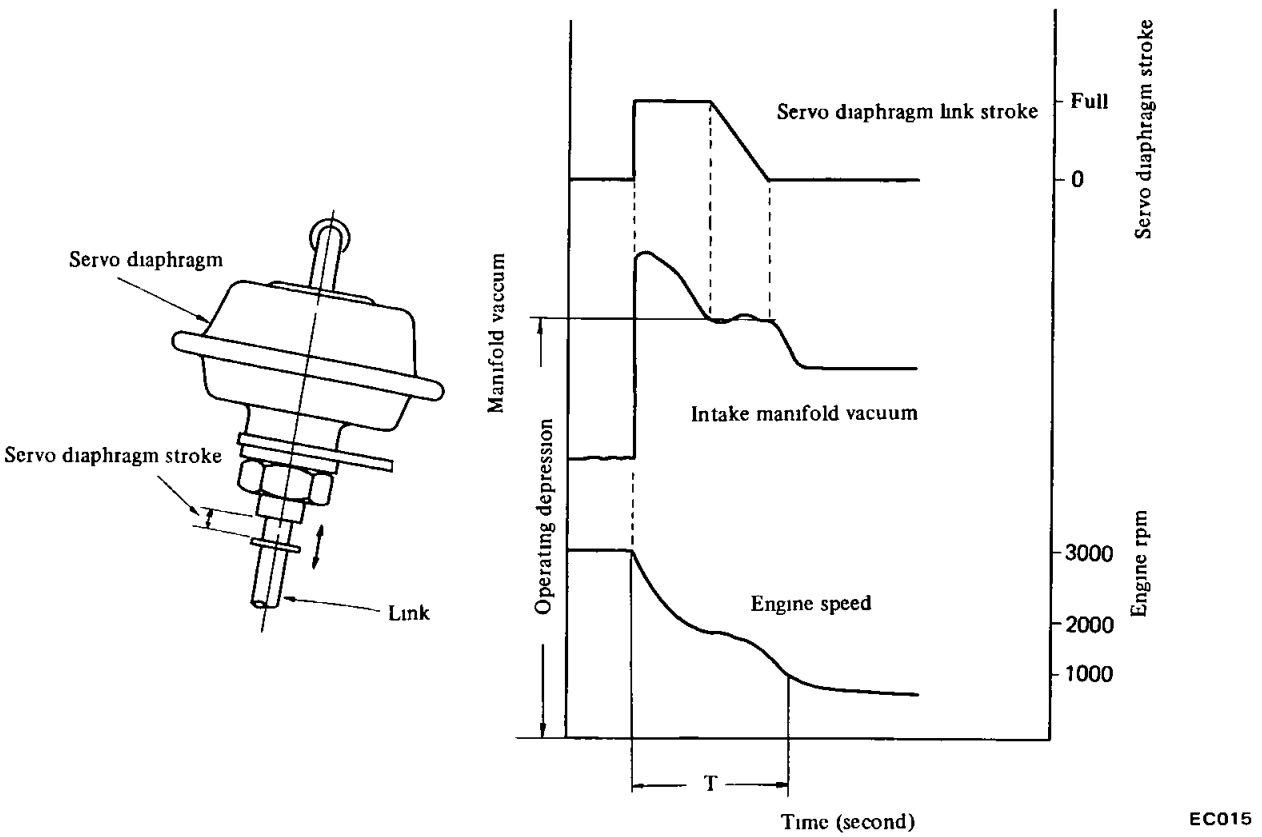


Fig EC-26 Changes in servo diaphragm link stroke, intake manifold vacuum and engine speed

As the engine speed lowers, negative pressure generated in the intake manifold also lowers However, dropping of negative pressure in the intake manifold is suspended for a few seconds by operating the servo diaphragm and control valve (In the graph shown in Figure EC-26, curve is comparatively flat) Thus, HC emission emitted under these conditions is controlled by these devices

The comparatively flat portion of the curve shown in Figure EC-26 is called "Operating depression "

6 Operating depression changes depending on altitude, and thus, servo diaphragm and control valve operations are adjusted in coincidence with the altitude at which the vehicle is driven automatically The graph shown in Figure EC-27 indicates change in operating depression for changes in atmospheric pressure and altitude

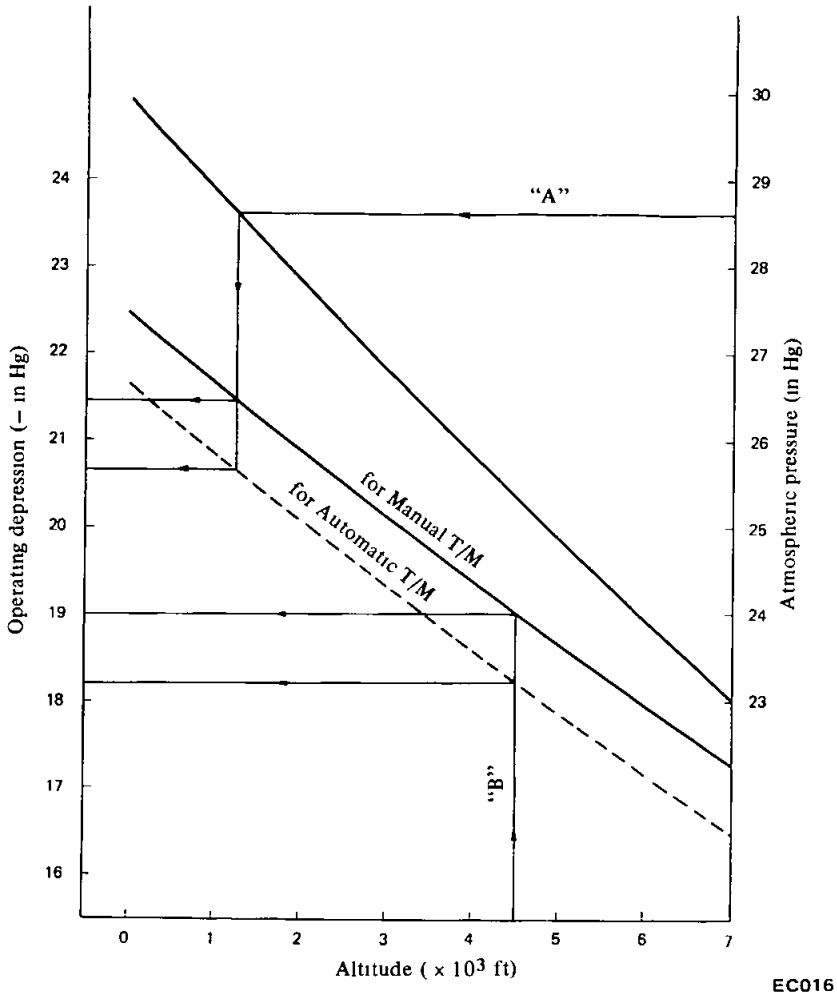
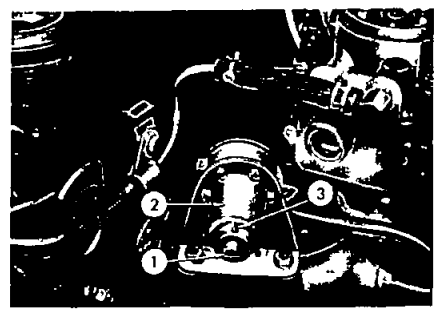


Fig EC-27 Changes in operating depression for changes in atmospheric pressure and altitude

How to read Figure EC-27 (Determining operating depression) and adjustment of control valve

(1) When atmospheric pressure is known, operating depression is found by following the arrow line "A" When altitude is known, operating depression is found by following the arrow line "B"

(2) Turn the adjusting screw of the control valve (See Figure EC-28) and adjust the control valve so that negative pressure in the intake manifold is suspended for a few seconds at the value of operating depression found as described in (1) above while the engine speed decreases from 3,000 rpm to 1,000 rpm



1 Vacuum adjusting screw 2 Control valve 3 Lock screw

Fig EC-28 Control valve

Adjustment with a tachometer

If a vacuum gauge is not available, use the following steps

1 Install a tachometer

2 With the engine unloaded, increase the engine speed to 3,000 rpm, and release the throttle valve lever Normally, the engine speed lowers as shown in Figure EC-26

3 The time required for lowering the engine speed from 3,000 rpm to 1,000 rpm is normally 4 0 ± 0 5 seconds in case of manual transmission or 3 0 ± 0 5 seconds in case of automatic transmission

(1) When engine speed lowers in shorter time than this range, turn the adjusting screw of the control valve clockwise

(2) When the engine speed lowers in longer time than this range, turn the adjusting screw of the control valve counterclockwise

Upon completion of the adjustment, tighten the lock screw, and make sure again that the throttle valve closing timing is correct

Notes

a When turning the vacuum adjusting screw, do not depress the screw with a screwdriver

b When measuring operating depression and engine speed slowdown time, be sure to tighten the lock screw of the control valve first

c When the servo diaphragm does not draw the link or operating depression is high vacuum, turn the vacuum adjusting screw clockwise When the servo diaphragm draws the link at idling speed or operating depression is low vacuum, turn the vacuum adjusting screw counterclockwise

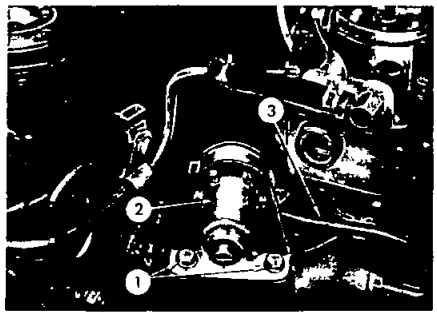
Set the lock screw stationarily, repeat the above described adjustment, and make sure that the operating depression is correct and that the engine speed settles down at the rated idling speed

Removal

When replacing the control valve and servo diaphragm, the following instructions apply

Control valve

1 Disconnect the vacuum tube from the control valve
2 Remove two set screws

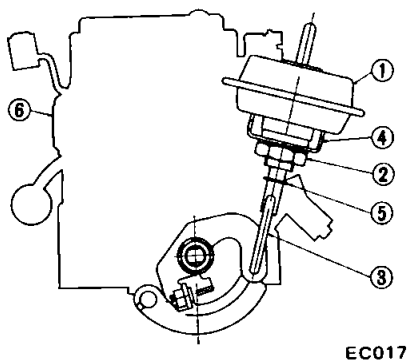


1 Installation bolt
2 Control valve
3 Vacuum tube

Fig EC-29 Removing control valve

Servo Diaphragm

1 Disconnect the vacuum tube from the servo diaphragm
2 Remove the servo diaphragm together with the carburetor
3 Withdraw the cotter pin, and remove the link
4 Loosen the lock nut, and remove servo diaphragm from the carburetor



1 Servo diaphragm
2 Lock nut
3 Link
4 Bracket
5 Stopper
6 Carburetor

Fig EC-30 Servo diaphragm

Transmission controlled vacuum advance

Inspection

Disengage the clutch and race the engine at normal ambient temperature (if ambient temperatures are low, warm up the engine), and pull off the vacuum hose from the distributor And by checking the hose with fingers, if vacuum is felt at the top gear position and is not felt at other positions, it is satisfactory

It is correct if vacuum is always felt at low temperatures (below 50°F) before the engine is warmed up

Note Lock the front and rear wheels by fully pulling the parking brake lever before conducting this test

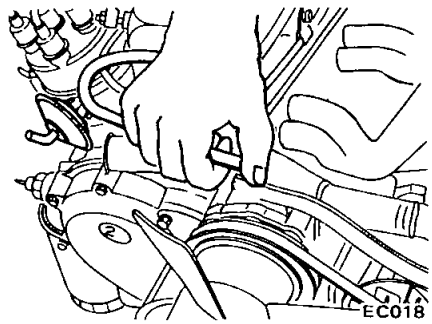


Fig EC-31 Checking for operating of vacuum advance system

If any malfunction is found by the check mentioned above, any of the following defects may be the cause
1 Poor connection or broken harness and fuse
2 Air leakage resulting from poor connection of vacuum tube
3 Incorrect operation of gear switch
4 Defective operation of solenoid valve
5 Incorrect operation of temperature sensing switch

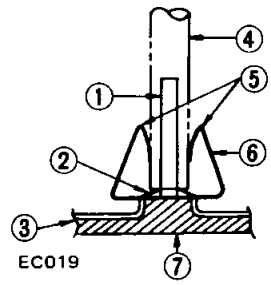
Automatic temperature control air cleaner

Removal of sensor

1 Flatten the tabs of clip with pliers
2 Pull off the hoses

Note Note the respective positions of the hoses from which they were removed

3 Pry the tab of clip with a screwdriver
4 Take off the sensor and clip



1 Pipe
2 Catch
3 Fixed with adhesive
4 Hose
5 Tab
6 Clip
7 Gasket

Fig EC-32 Removal of sensor

Installation of sensor

1 Install the sensor and gasket assembly in the proper positions

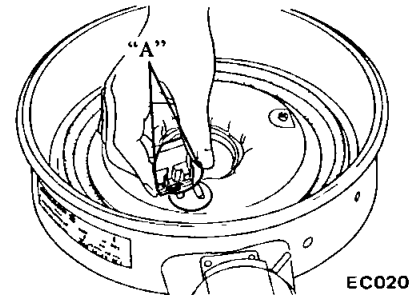


Fig EC-33 Installing sensor

2 Insert clip Be sure to hold the sensor at the portion "A" in Figure EC-33 to avoid damage

Press fit the clips into the pipe while straightening the tabs

Note Use care not to damage the sensor

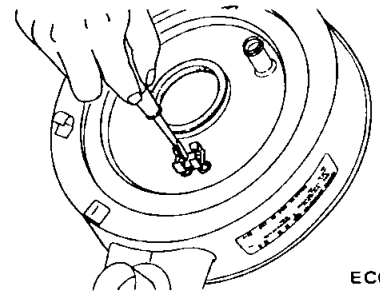


Fig EC-34 Inserting clip

3 Connect the hoses to their proper positions

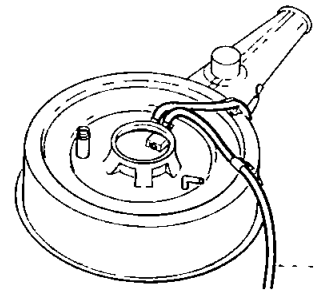


Fig EC-35 Connecting hoses

Inspection

Among the possible troubles of this device, the most liable is the permanent opening of valve

This trouble is not noticed in warm weather, but in cold weather appears as poor performance of engine, such as tardy acceleration, hesitation or engine stall When such a claim has been raised by the user, first inspect this device before checking the carburetor

Another trouble which might be expected is that the underhood-air is kept closed by the valve regardless of the temperture of suction air around the sensor while the engine is running This trouble appears in the form of extremely excessive fuel consumption or decrease in power

The inspection of this device should be proceeded as follows

Appearance

1 First inspect whether the vacuum hoses are connected to the correct positions

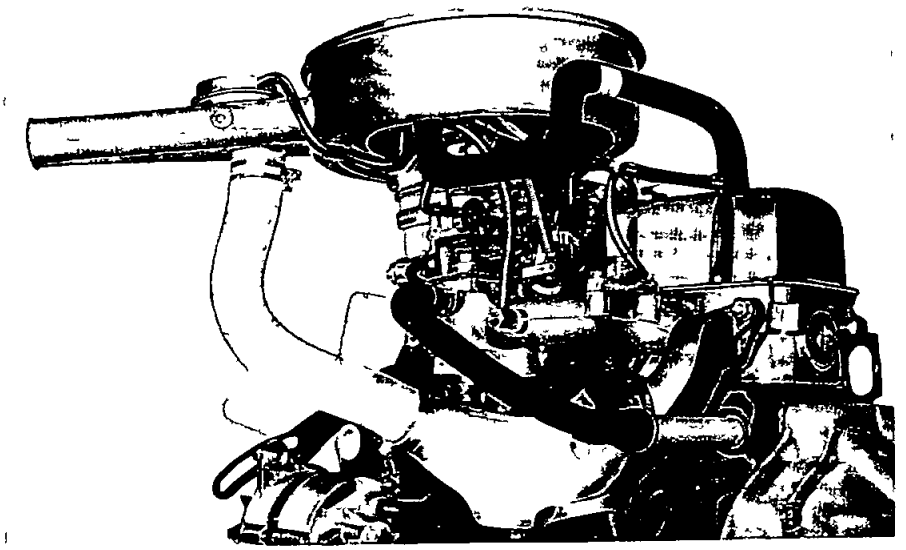


Fig EC-36 Correct position of hoses

2 Inspect the hoses for cracks, distortion or plugging

Checking of vacuum motor

1 With the engine stopped, inspect the position of valve (placing a mirror at the end of inlet pipe for inspection) The correct condition of valve is that it keeps the inlet of underhood-air open and that of hot air closed Otherwise, inspect the linkage of valve

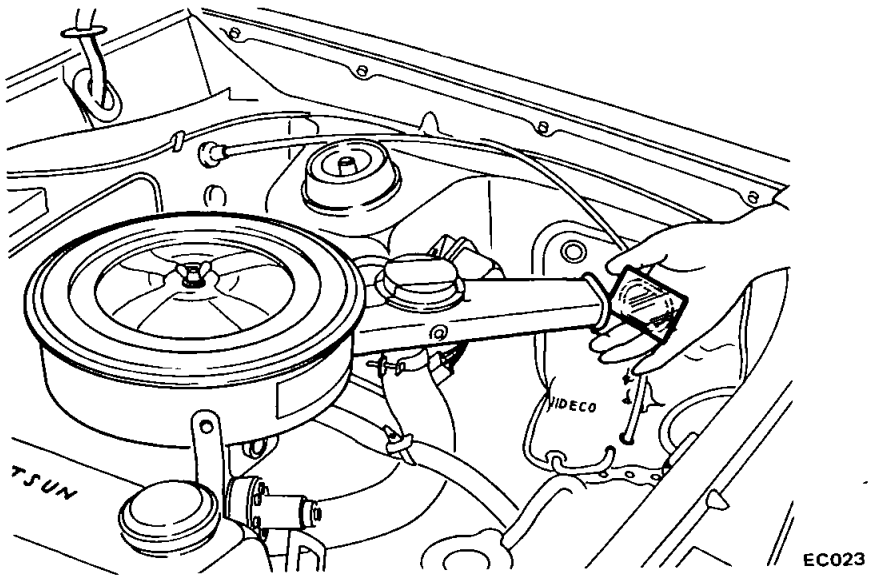


Fig EC-37 Inspecting valve position

2 Disconnect the hose at the vacuum motor inlet, and directly apply vacuum of manifold to vacuum motor by connecting another hose, sucking by the mouth may be substituted for this process If underhood-air inlet is closed by the valve, valve is in good condition Inspect linkage if found otherwise And when no defect is found in the linkage, trouble is in the vacuum motor

If the valve does not close, then inspect linkage

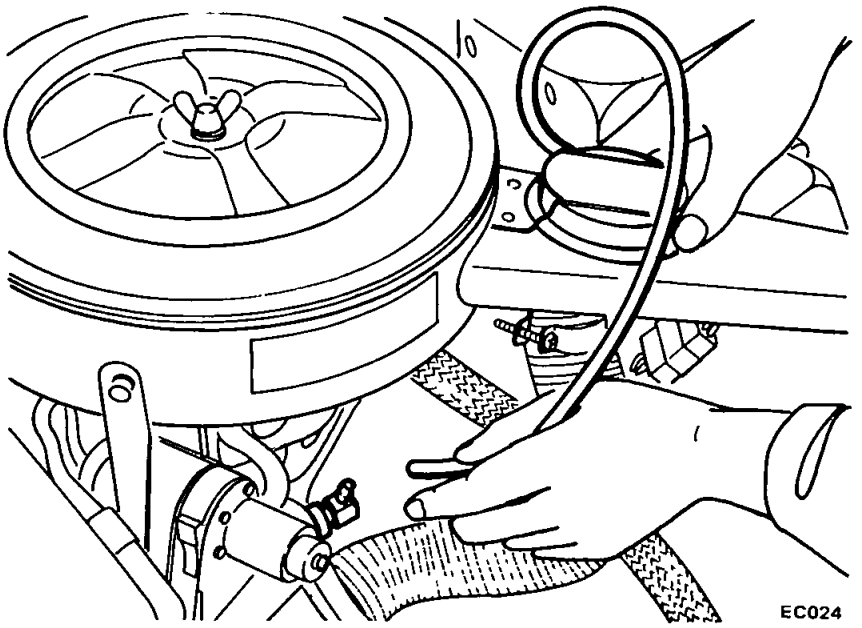


Fig EC-38 Checking vacuum motor

3 The valve shows correct condition if it keeps underhood-air inlet closed when the passage in the hose is stopped by twisting or clamping it while applying vacuum If otherwise, it is an indication of leakage in the vacuum motor

4 When defect is found by this check, replace the air cleaner assembly

Checking of sensor

1 Perform the engine test by keeping the temperature around the sensor below 85°F Make sure that the engine is cooled down before the test is conducted

2 Before running the engine, make certain that the valve on underhood-air side is fully opened

3 Start the engine and operate it at an idling speed The valve is in good condition if underhood-air side fully closes immediately after starting

4 Carefully watch the valve to ascertain that it gradually begins to open as the engine warms up But, when the ambient temperature is as low as 30°F, it takes considerable length of time for the valve to begin to open, or in some case it hardly opens This should not, however, be regarded as trouble

If the valve does not operate satisfactorily or if its condition is questionable, conduct the following test

5 Remove the air cleaner cover, and put a thermister or a small thermometer as close to the sensor as possible with adhesive tape Install the air cleaner cover again

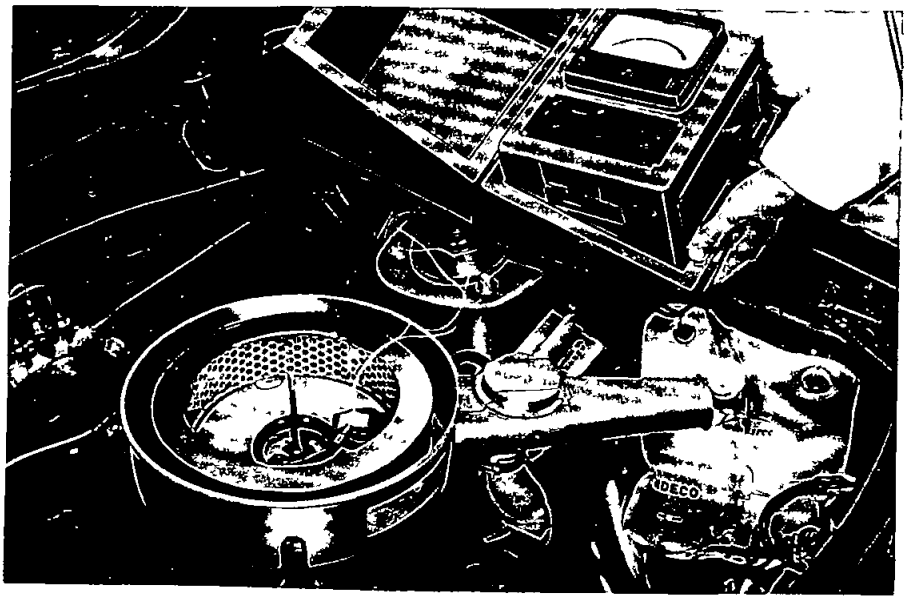


Fig EC-39 Checking sensor

6 Start the engine and continue idling as described under paragraphs (1), (2), and (3) above When several minutes have passed and the valve is partially opened, read the thermister indication It is correct if the reading falls between 100° and 130°F If the reading is abnormal, replace the sensor

7 On the engine equipped with an idle compensator as service option, do as follows before replacing the sensor

Clog the hose on idle compensator side by twisting or clamping it, and check the temperature as given in paragraphs (5) and (6) above If the thermometer shows correct temperature, replace the idle compensator, if the reading is abnormal, replace the sensor

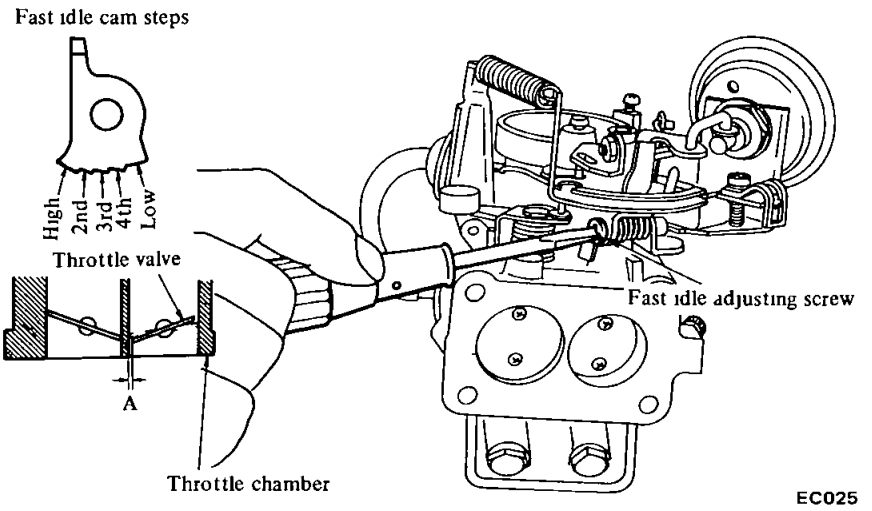


Fig EC-40 Fast idle adjustment

Electric automatic choke

Adjustment

Fast idle adjustment

1 Remove the bi-metal cover

2 Place the fast idle arm on the second step of the fast idle cam Then adjust the fast idle adjusting screw in such a way that the clearance of the throttle valve (shown at "A" in the illustration) will be 0 033 inch for manual transmission vehicle, and 0 044 inch for automatic transmission vehicle

Notes

a If engine speed does not rise sufficiently and is unstable after starting, adjust the clearance until there exists a clearance of 0 004 inch wider than the specified value

b If engine over-speeds after starting, adjust until the clearance of 0 004 inch is obtained

Vacuum break adjustment

1 Completely close the choke valve

2 Hold the choke valve by stretching the rubber band between choke shaft lever and the stationary part of carburetor

3 Grip the vacuum break stem with pliers, and pull out fully

4 Under this condition, adjust the gap (shown by "B" in the illustration) between the choke valve and carburetor body to 0 038 inch for manual transmission vehicle, and 0 042 inch for automatic transmission vehicle, by bending vacuum break rod

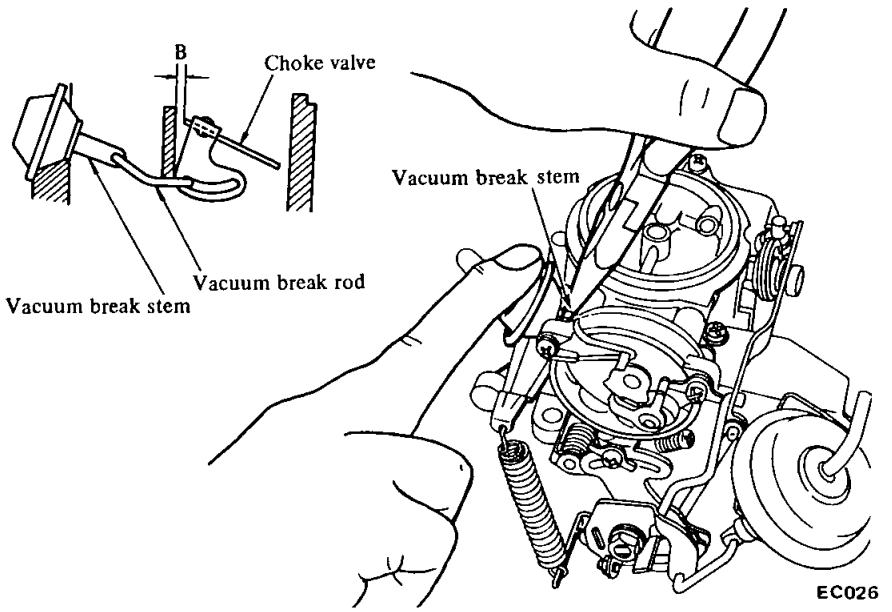


Fig EC-41 Vacuum break adjustment

Choke unloader adjustment

1 Completely close the choke valve

2 Hold the choke valve by stretching a rubber ring between the choke shaft lever and the stationary part of the carburetor

3 Open the throttle lever until it fully opens

4 Under this condition, adjust the clearance "C" in the illustration between the choke valve and the carburetor body to 0 079 inch by bending unloader tongue

Note Make sure that the throttle valve fully opens when the carburetor is mounted on the vehicle If the throttle valve fails to open fully, the unloader becomes inoperative, resulting in poor acceleration after the engine is started

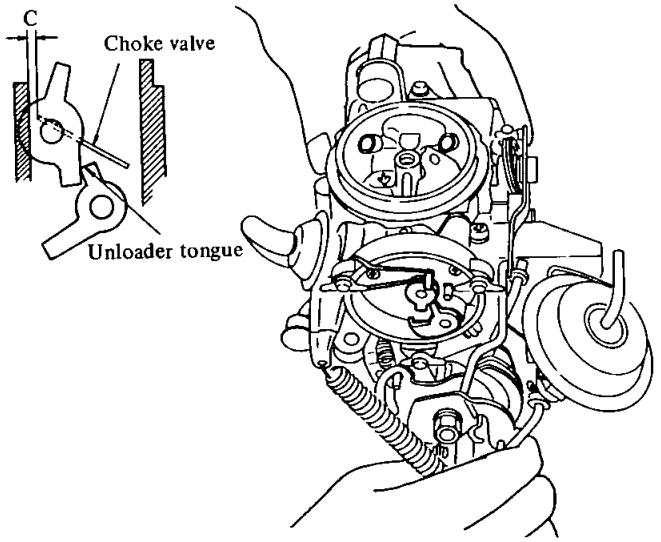


Fig EC-42 Choke unloader adjustment

Dash pot adjustment
(Automatic transmission vehicles only)

1 It is necessary that the idling speed of engine and mixture have been well tuned up and engine is sufficiently warm

2 Turn throttle valve by hand, and read engine speed when the dash pot just touches the stopper lever

3 Adjust the position of the dash pot by turning the nut until the engine speed is in the range from 1,900 to 2,000 rpm

4 Make sure that the engine speed is smoothly reduced from 3,000 to 1,000 rpm in about five seconds

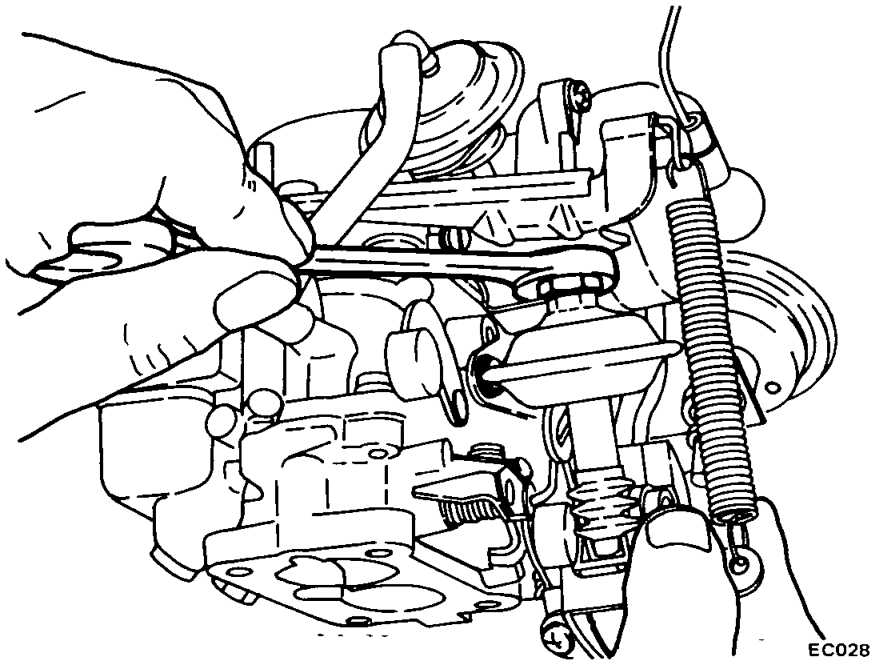


Fig EC-43 Dash pot adjustment

Bi-metal setting

1 Measurement of bi-metal heater resistance

Install the bi-metal cover in place on the carburetor Make sure that the resistance across the terminal and the carburetor body is in the range from 9 2 to 9 6 ohms Measure the resistance without the flow of electric current through the heater and at about 70°F

Note Use an accurate measuring instrument, such as a wheatstone bridge

2 Bi-metal cover setting

Position the bi-metal cover until the index mark is aligned at the middle point of the scale

Note When somewhat over-choked, set bi-metal cover after turning it clockwise by about one division of the scale graduations

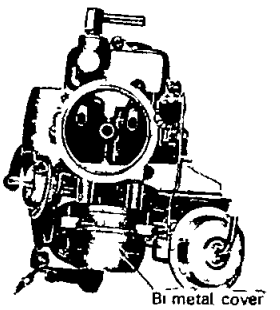


Fig EC-44 Bi-metal cover setting

EVAPORATIVE EMISSION CONTROL SYSTEM

Checking fuel tank, vapor-liquid separator and vapor vent line

1 Check all hoses and fuel tank filler cap

2 Disconnect the vapor vent line connecting flow guide valve to vapor-liquid separator

3 Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way change cock) to the end of the vent line

4 Supply fresh air into the vapor vent line through the cock little by little until the pressure becomes 14 5 inch Aq
5 Shut the cock completely and leave it that way
6 After 2 5 minutes, measure the height of the liquid in the manometer
7 Variation of height should remain within 1 0 inch Aq
8 When the filler cap does not close completely the height should drop to zero in a short time
9 If the height does not drop to zero in a short time when the filler cap is removed, it is the cause of the stuffy hose

Note In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock It must therefore be repaired or replaced

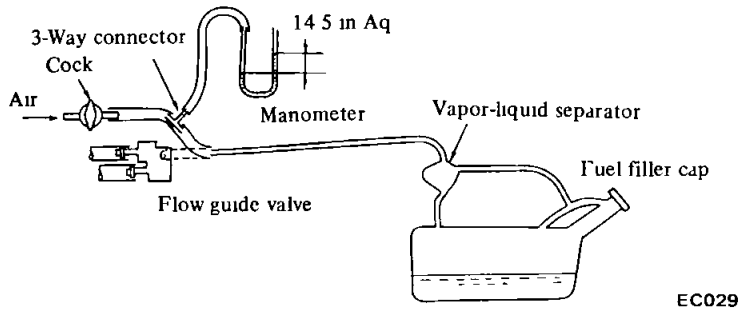


Fig EC-45 Checking evaporative emission control system

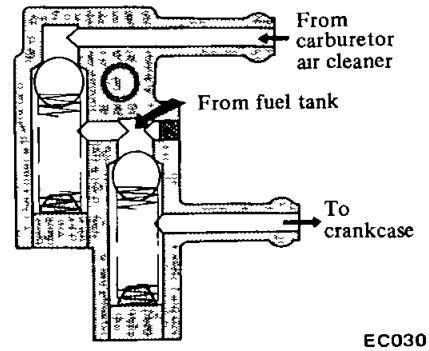


Fig EC-46 Flow guide valve

Checking flow guide valve

1 Disconnect all hoses connected to the flow guide valve
2 While lower pressure air is pressed into the flow guide valve from the ends of vent line of fuel tank side, the air should go through the valve and flow to crankcase side If the air does not flow the valve should be replaced But when the air is blown from crankcase side, it should never flow to the other two vent lines
3 While the air is pressed into the flow guide valve from the carburetor air cleaner side, it flows to the fuel tank side and/or crankcase side
4 This valve opens when the inner pressure is 0 4 inch Hg In case of improper operations or breakage, replace it

ADJUSTING IGNITION TIMING, ENGINE IDLING SPEED AND GAS MIXTURE

CONTENTS

ADJUSTING IGNITION TIMING EC-21
ADJUSTING IDLING SPEED AND GAS MIXTURE EC-22
Adjusting only with a tachometer EC-22
Adjusting with CO meter and tachometer EC-22

ADJUSTING IGNITION TIMING

1 Check the spark plugs and distributor breaker points for condition
2 Thoroughly wipe off dirt and dust from the timing mark on the crank pulley (Figure EC-47)
3 Warm up the engine sufficiently
4 Install a timing light on the No 1 cylinder spark plug wire, and install a tachometer
5 Loosen the set screw to such an extent that the distributor can be moved by hand
6 Set the idling speed to approximately 700 rpm
7 Adjust the ignition timing to 5° BTDC (Before Top Dead Center) by the use of timing light
8 Lock the distributor set screw, and make sure that the timing is correct

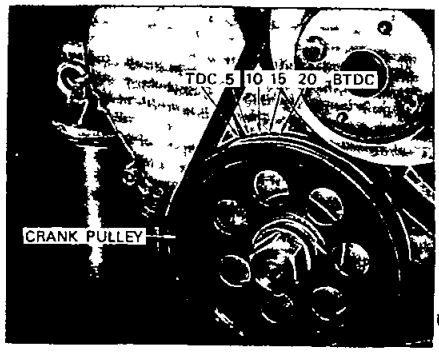


Fig EC-47 Timing marks on crank pulley

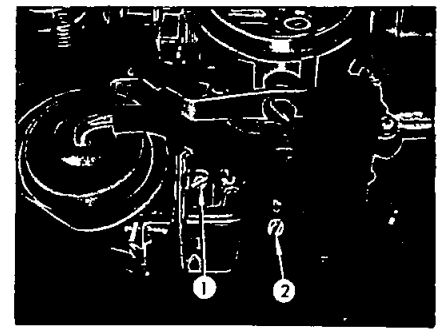
ADJUSTING IDLING SPEED AND GAS MIXTURE

Adjusting only with a tachometer

1 Warm up the engine sufficiently
2 Continue engine operation for one minute under idling speed
3 Adjust the throttle adjusting screw and idle adjusting screw correctly so that best engine idling speed is obtained (750 rpm for vehicle with manual transmission and 780 rpm for vehicle with automatic transmission)
4 Turn the idle adjusting screw clockwise (for a leaner mixture) and reduce the engine speed to 700 rpm (750 rpm for the vehicle with automatic transmission)
5 In the case of an automatic transmission model, make sure that idling speed is approximately 600 rpm when the shift lever is set to "D" range

Adjusting with CO meter and tachometer

1 Warm up the engine sufficiently
2 Continue engine operation for one minute under idling speed
3 Adjust the throttle adjusting screw so that engine speed is 700 rpm for the vehicle with manual transmission (750 rpm for the vehicle with automatic transmission)
4 Adjust the idle adjusting screw so that CO percentage is 2 0%
5 Repeat the adjustments as described in 3 and 4 above so that CO percentage is 2 0 at 700 rpm (CO percentage 2 0 at 750 rpm in the case of an automatic transmission model)
6 In the case of an automatic transmission model, make sure that the idling speed is approximately 600 rpm when the shift lever is set to "D" range



1 Throttle adjusting screw
2 Idle adjusting screw

Fig EC-48 Throttle adjusting screw and idle adjusting screw

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Rough engine idle or engine stop	Incorrect carburetor adjustment idle speed, idle mixture, choke setting	Adjust idle speed mixture and timing
	Incorrect basic ignition timing	
	Incorrect automatic temperature control air cleaner	Adjust automatic temperature control air cleaner
	Defect or malfunction of ignition system (spark plug, high tension cable, breaker point, ignition coil etc)	Adjust or replace ignition system
Engine idle too fast	Trouble in throttle link and cable	Check throttle link and cable
	Incorrect throttle opener adjustment	Adjust throttle opener
	Trouble in control valve	Replace control valve
	Trouble in automatic choke	Adjust automatic choke
	Defect or malfunction of ignition system (spark plug, high tension cable, breaker point, ignition coil etc)	Adjust or replace ignition system
Car knock when coasting	Incorrect throttle opener adjustment	Adjust throttle opener
	Trouble in control valve	Replace control valve
	Defect or malfunction of ignition system (spark plug, high tension cable, breaker point, ignition coil etc)	Adjust or replace ignition system

SERVICE MANUAL

EMISSION CONTROL SYSTEM

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION L16

L16 ENGINE

L16

GENERAL DESCRIPTION	EC-24
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EXHAUST EMISSION CONTROL SYSTEM	EC-26
EVAPORATIVE EMISSION CONTROL SYSTEM	EC-37
TROUBLE DIAGNOSES AND CORRECTIONS	EC-39
MAINTENANCE AND TESTING	EC-39
TESTING IGNITION TIMING, ADJUSTING IDLE SPEED AND MIXTURE	EC-49

L16 ENGINE

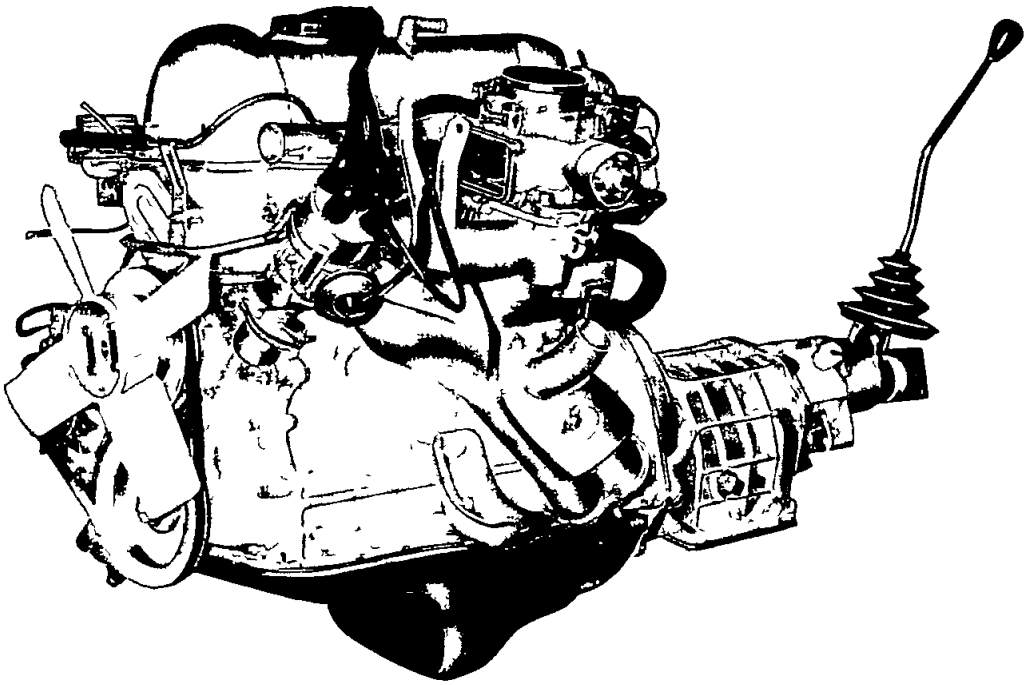


Fig. EC-49 Left hand side external view

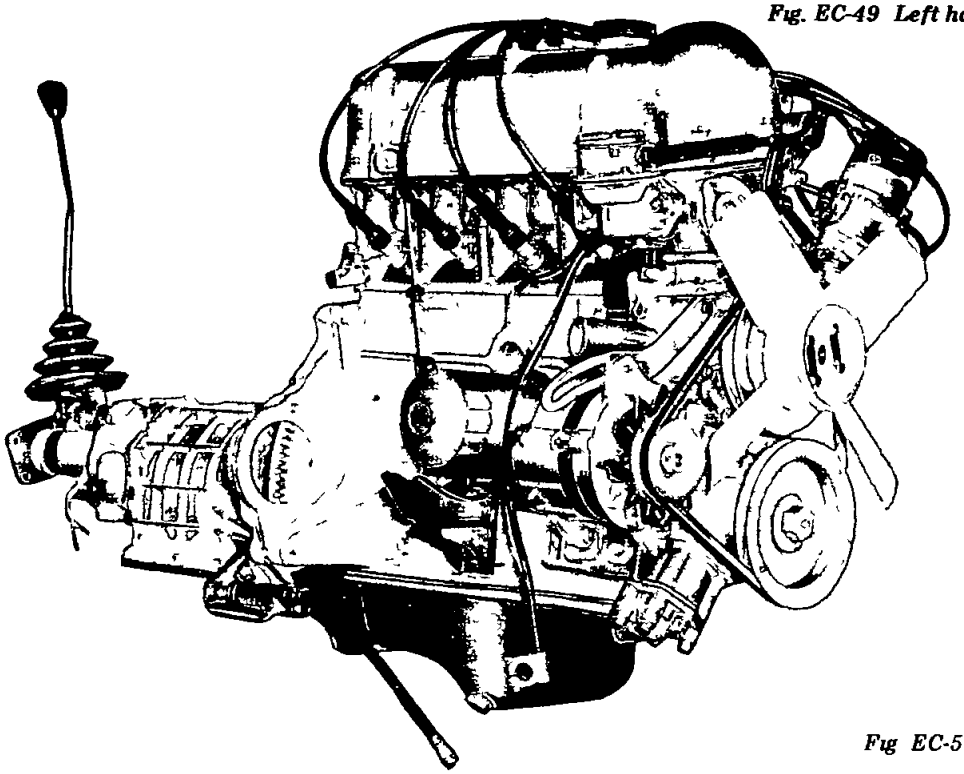


Fig EC-50 Rear external view

GENERAL DESCRIPTION

There are three types of emission that must be controlled These are

1 Crankcase emission control system

Closed system

2 Exhaust emission control system

Engine modifications

3 Evaporative emission control system

Periodic inspection and required servicing of these systems should be carried out at the recommended intervals to assure a cleaner, better performance, longer-lasting engine and the most complete elimination of air pollution

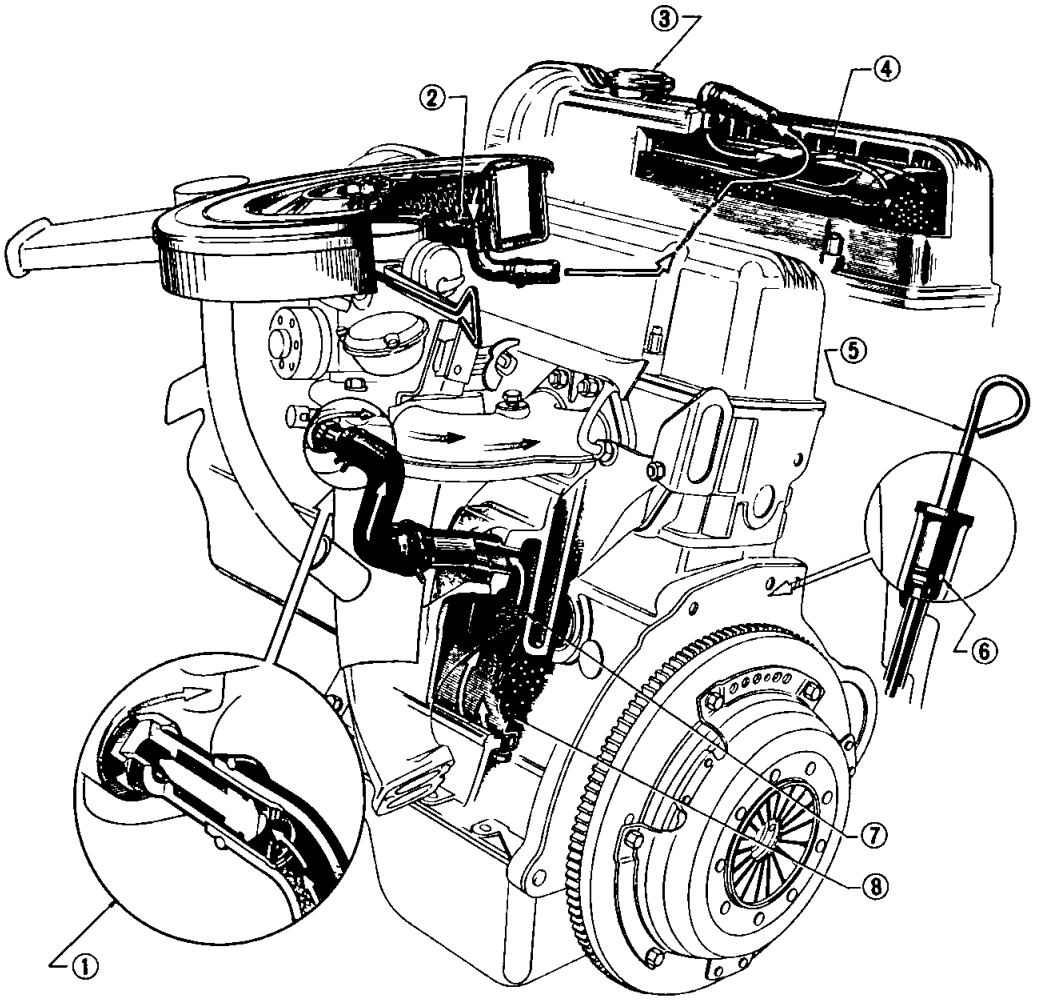
CRANKCASE EMISSION CONTROL SYSTEM

CLOSED SYSTEM

This system provides for the return of blow-by gases to both intake manifold and carburetor air cleaner

A variable orifice valve is provided to conduct crankcase blow-by gases to the intake manifold During part-throttle operation of the engine the intake manifold sucks the blow-by gases through the valve Normally, the capacity of the valve is sufficient, under these conditions, to handle any blow-by plus a small amount of ventilating air The ventilating air is then drawn from the clean side of the carburetor air cleaner, through the tube connection, into the crankcase

Under full-throttle conditions, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the sealed system in the reverse direction In cars with an excessively high blow-by some of the flow will go through the tube connection to the carburetor air cleaner under all conditions



EC031

1 Crankcase ventilation control valve
2 Flame arrester
3 Sealed filler cap
4 Baffle plate
5 Oil level gauge
6 "O" Ring
7 Oil separator
8 Baffle plate

Fig EC-51 Crankcase emission control system (closed type)

PERIODIC SERVICE

Once a year or every 12,000 miles, the Crankcase Emission Control System should be serviced as follows

1 Check hoses and hose connectors for leaks

2 Disconnect all hoses and blow them out with compressed air

If any hose cannot be free of obstructions, replace with a new one

3 Check the function of the crankcase ventilation control valve If the valve is found defective replace it with a new assembly

The control valve assembly should be replaced with a new one every 24,000 miles

EXHAUST EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION	EC-26	Throttle switch	EC-32
CAMSHAFT MODIFICATION	EC-26	Dual point distributor	EC-33
SPARK TIMING CONTROL SYSTEM (DUAL POINT DISTRIBUTOR)	EC-26	AUTOMATIC TEMPERATURE-CONTROL AIR CLEANER (A T C AIR CLEANER)	EC-34
PL510, WPL-510 and PL521 with manual transmission	EC-26	Description	EC-34
PL510 and WPL510 with automatic transmission	EC-29	LEAN CARBURETION	EC-36
Accelerator switch (PL521 only)	EC-31	ELECTRIC AUTOMATIC CHOKE	EC-36
Transmission (third gear) switch	EC-31	BOOST CONTROLLED DECELERATION DEVICE (B C D D)	EC-36
Temperature sensing switch	EC-32	Description	EC-36
Speed switch and speed detector	EC-32	Performance	EC-37

DESCRIPTION

Effective with the 1972 model vehicles and later products, the former A I S (Air Injection System) was cancelled and the new E M S (Engine Modification System) was employed The new system consists essentially of the following components

1 Modified combustion chamber configuration
2 Camshaft modification
3 Spark timing control system (Dual point distributor)
4 Automatic temperature control air cleaner
5 Lean carburetion
6 Electric automatic choke
7 Boost-controlled deceleration device

CAMSHAFT MODIFICATION

Reduction of NOx has been obtained by increasing the area of overlap

		1972 model	1971 model
Intake open	deg BTDC	12	12
Intake close	deg ABDC	48	48
Exhaust open	deg BBDC	54	50
Exhaust close	deg ATDC	14	10
Over-lap	deg	26	22

SPARK TIMING CONTROL SYSTEM (DUAL POINT DISTRIBUTOR)

In this system two spark timings, namely, "Advanced" and "Retarded", are provided and they can be used independently by electrical means Between these two timings there is a phase difference of 7 crank-degrees (10 degrees for 1971 model vehicles) The "Retarded" timing is intended for the operating condition as required when driving in urban district and serves to prevent air pollution, while the "Advanced" timing is provided to meet the requirement when driving in the suburbs

PL510, WPL510 and PL521 with manual transmission

This system comprises a temperature sensing switch, a throttle switch, a third gear switch, a relay, and a dual-point distributor, and the "Retarded" timing is used when the following conditions are satisfied when driving (See Fig 52)

1 The temperature inside the passenger compartment is above 50°F.
2 The throttle valve is opened at an angle of from 3 to 30 deg for PL510 and WPL510 and 3 to 40 deg for PL521
3 The shift lever is placed at 3rd gear position

SCHEMATIC DRAWING OF CONTROL SYSTEM
FOR L16 ENGINE WITH MANUAL TRANSMISSION MODELS PL510 and WPL510

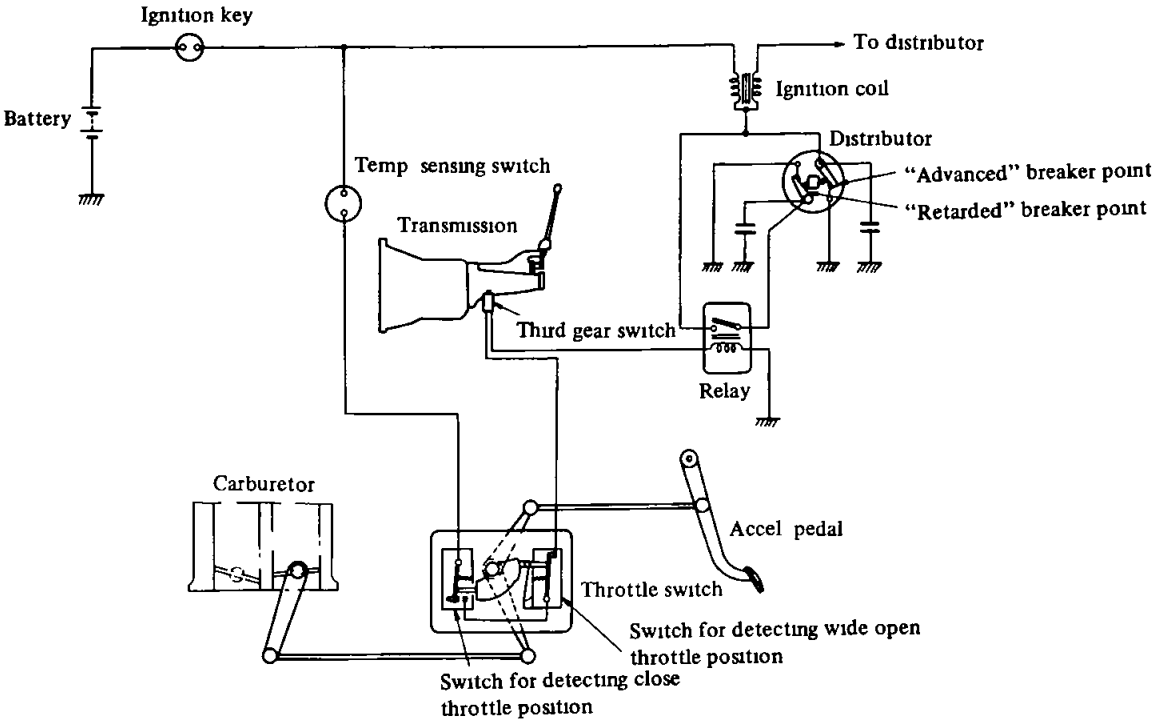


Fig EC-52-A Schematic drawing of control system for L16 engine with manual transmission

SCHEMATIC DRAWING OF CONTROL SYSTEM
FOR L16 ENGINE WITH MANUAL TRANSMISSION MODEL PL521

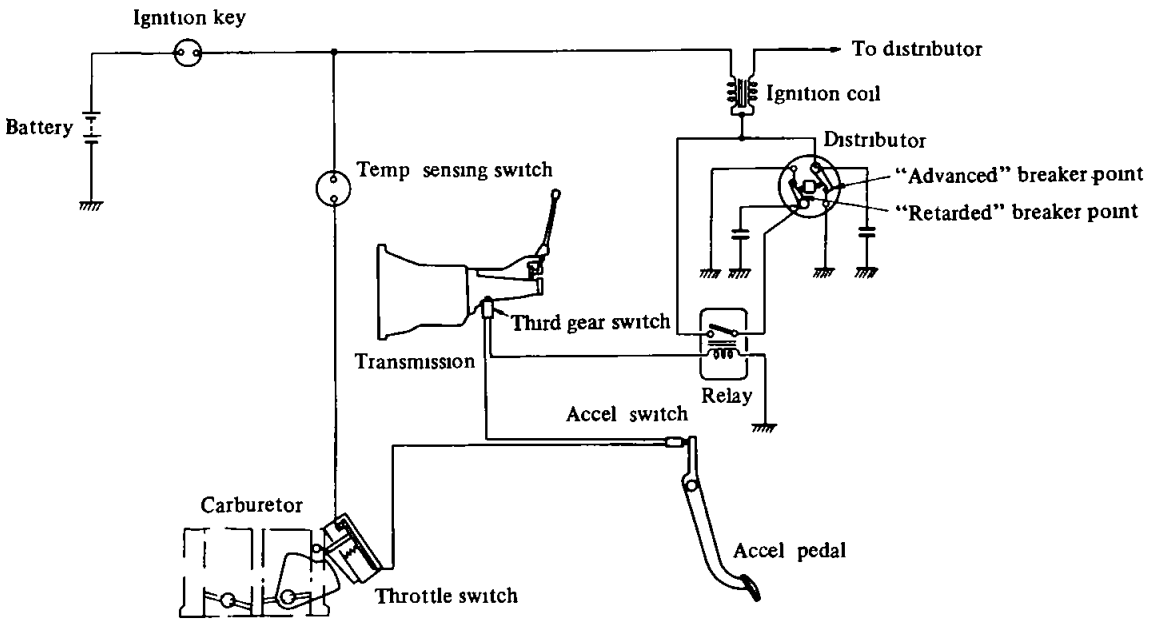


Fig EC-52-B Schematic drawing of control system for L16 engine with manual transmission

Table 1 shows the operation of each control switch under a normal operating condition of the vehicle

Note On PL521, the combination of the throttle switch on the carburetor and the accelerator switch is installed instead of the throttle switch on PL510

TABLE 1 OPERATIONS OF SPARK TIMING CONTROL SYSTEM (PL510, WPL510 and PL521 with M/T)

OPERATING CONDITION	*TEMPERATURE SENSING SW	THROTTLE SW		THIRD GEAR SW	SPARK TIMING	
		**Switch for detecting close throttle position	Switch for detecting wide open throttle position		"Advanced"	"Retarded"
Engine start and warming up (cold start)	OFF (below 34°F) ON (above 50°F)	ON	ON	OFF	○	—
Engine start (hot start)		OFF	ON	OFF	○	—
Idling		OFF	ON	OFF	○	—
Cruising or accelerating in 3rd gear with partially open throttle		ON	ON	ON	○ (below 34°F) (above 50°F) ○	
Cruising or accelerating in 1st, 2nd, and 4th gear with partially open throttle		ON	ON	OFF	○	—
Cruising or accelerating with wide open throttle		ON	OFF	ON (3rd) OFF (1st, 2nd, 4th)	○	—
Coasting		OFF	ON	ON (3rd) OFF (1st, 2nd, 4th)	○	—
Remarks	When the temperature of passenger compartment is below 34°F, this switch is "OFF" And when the temperature is above 50°F, the switch is "ON"	When the throttle valve is nearly closed, this switch is "OFF" When the valve is slightly opened, the switch is "ON"	When the throttle valve is opened more than 30 degrees for PL510 and WPL510, and 40 degrees for PL521, the switch is "OFF"	When the shift lever is in 3rd gear, the switch is "ON" And when the lever is in another gear position, the switch is "OFF"	When the "retarded" spark timing is provided, lower emission can be obtained	

*Note Operation of the temperature sensing switch is hysteresis of the bi-metal It opens at 52°F when temperature rises from low to high It closes at 34°F when temperature lowers from high to low

** In case of Datsun PL521, this section should be replaced by accel switch

M/T Manual transmission

PL510 and WPL510 with automatic transmission

This system consists of a temperature sensing switch, a speed switch, throttle switch and dual-point distributor, and the "Retarded" timing is used when the following conditions are fulfilled during drive (See Fig 53)

1 The temperature inside the passenger compartment is above 50°F

2 The vehicle speed is above 13 mph

3 The throttle valve is opened at an angle of from 3 to 35 deg

Table 2 shows the operation of each control switch under a normal operating condition of the vehicle

SCHEMATIC DRAWING OF CONTROL SYSTEM
FOR L16 ENGINE WITH AUTOMATIC TRANSMISSION

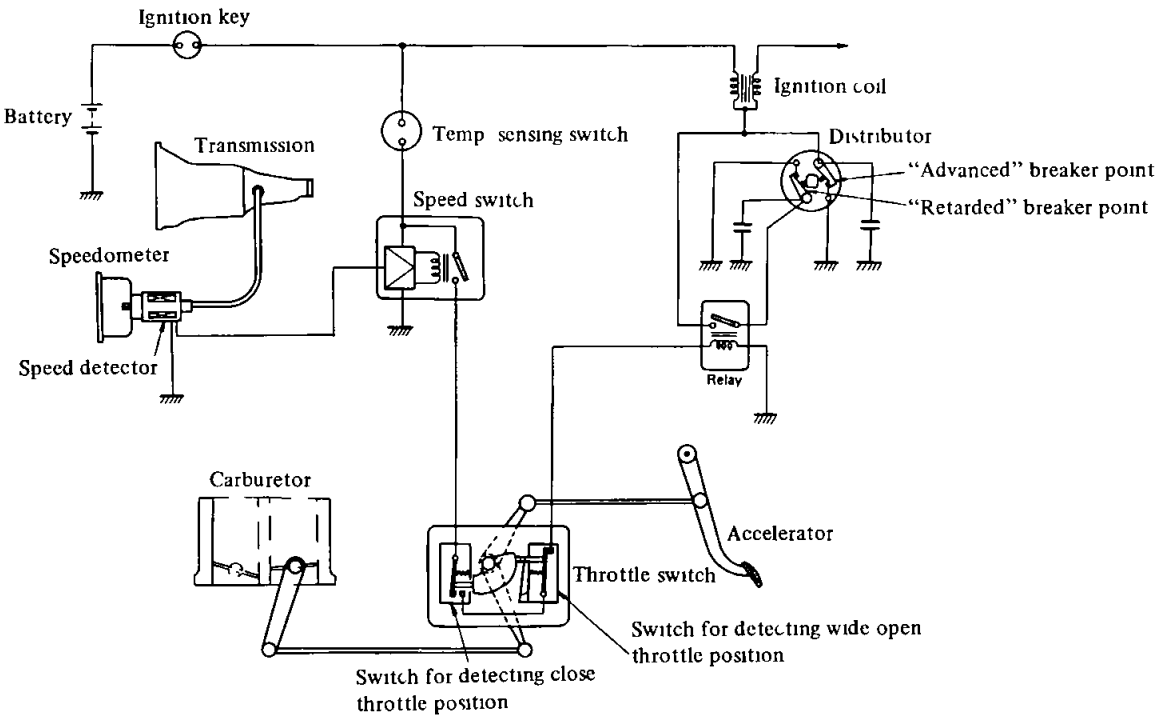


Fig EC-53 Schematic drawing of control system for L16 engine with automatic transmission

TABLE 2 OPERATIONS OF TIMING CONTROL SYSTEM (PL510, WPL510 with A/T)

OPERATING CONDITION	*TEMPERATURE SENSING SW	THROTTLE SW		SPEED SW	SPARK TIMING	
		Switch for detecting close throttle position	Switch for detecting wide open throttle position		"Advanced"	"Retarded"
Engine start and warming up (cold start)	OFF (below 34°F) ON (above 50°F)	ON	ON	OFF	○	—
Engine start (hot start)		OFF	ON	OFF	○	—
Idling		OFF	ON	OFF	○	—
Cruising or accelerating over 13 mph with partially open throttle		ON	ON	ON	○ (below 34°F) (above 50°F) ○	
Cruising or accelerating under 13 mph with partially open throttle		ON	ON	OFF	○	—
Cruising or accelerating with wide open throttle		ON	OFF	ON (above 13 mph) OFF (below 13 mph)	○	—
Coasting		OFF	ON	ON (above 13 mph) OFF (below 13 mph)	○	—
Remarks	When the temperature of passenger compartment is below 34°F, the switch is "OFF" And when the temperature is above 50°F, the switch is "ON"	When the throttle valve is nearly closed, the switch is "OFF" And when the valve is slightly opened, the switch is "ON"	When the throttle valve is open more than 35 degrees, the switch is "OFF"	When the car speed is under 13 mph, the switch is "OFF" And the speed is over 13 mph, the switch is "ON"	When the "retarded" spark timing is provided, lower emission can be obtained	

***Note Operation of the temperature sensing switch is hysteresis of the bi-metal It opens at 52°F when temperature rises from low to high It closes at 34°F when temperature lowers from high to low**

A/T Automatic transmission

Accelerator switch (PL521 only)

This switch is set at the dashboard and operated by the movement of the accelerator pedal

This show "ON" when the pedal is depressed, otherwise showing "OFF"

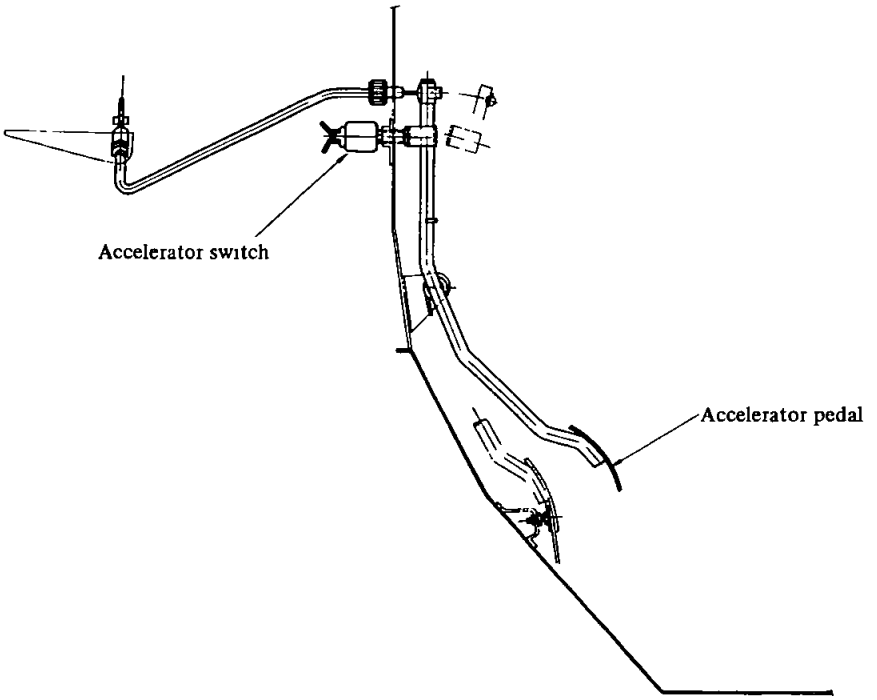
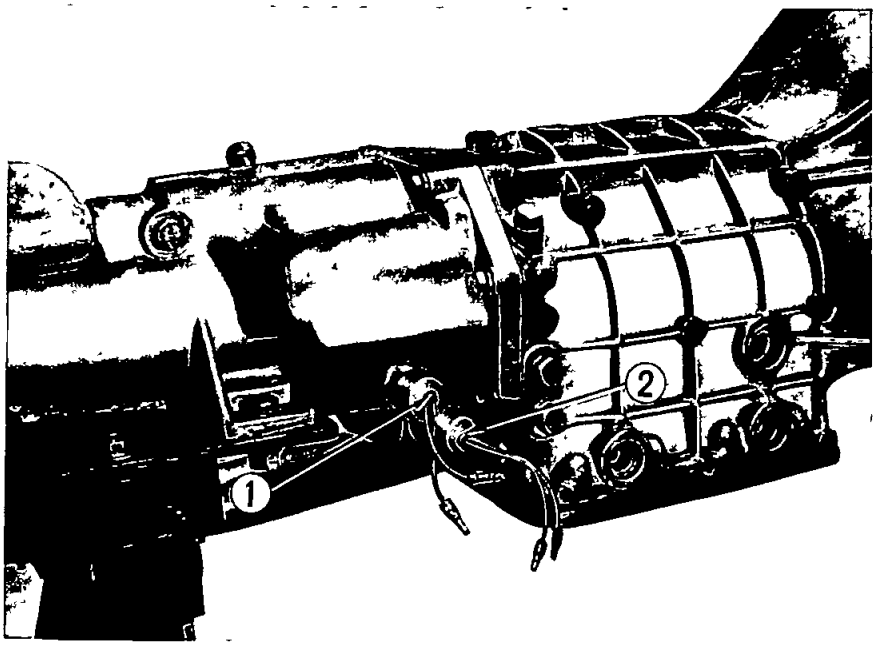


Fig EC-54 Accelerator switch installation

Transmission (third gear) switch

This switch is applicable to the PL510, WPL510 and PL521 with manual transmission

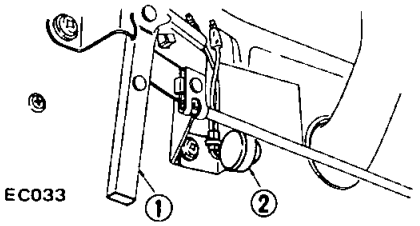
The switch is operated by the movement of the striking rod and the fork rod in the transmission The third gear switch shows "ON" when gear position is in third, otherwise showing "OFF"



1 Third gear switch
2 Reverse gear switch

Fig EC-55 Gear switch installation

Temperature sensing switch



1 Hood lock control lever 2 Temperature sensing switch

Fig EC-56 Position of temperature sensing switch

Speed switch and speed detector

These are applicable to the PL510 and WPL510 with automatic transmission

The speed detector is set in the middle of the speedometer cable at dashboard to transmit the variation of vehicle speed to speed switch The speed switch shows "OFF" when the vehicle speed is 0 to 13 mph and "ON" when it exceeds 13 mph

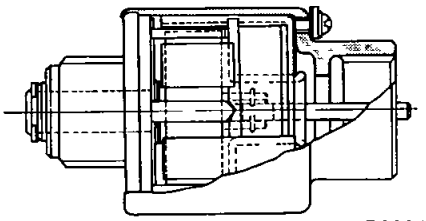
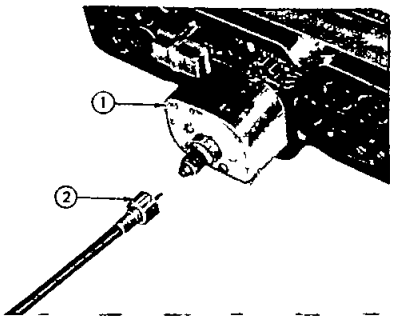


Fig EC-57 Sectional view of speed detector



1 Speedometer 3 Speedometer cable
2 Speed detector

Fig EC-58 Speed detector

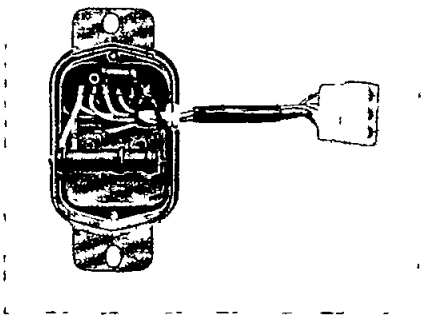
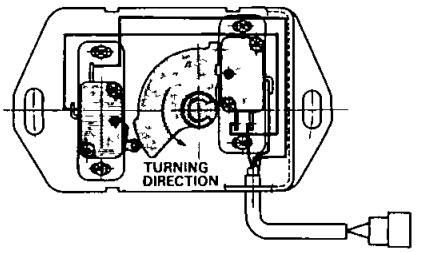


Fig EC-59 Speed switch

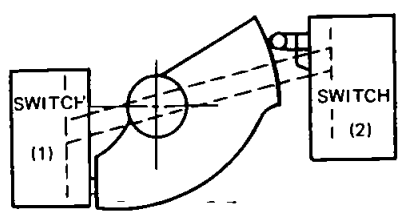
Throttle switch

On the Datsun PL510 and WPL510, this switch is set on the bell crank of the accelerator linkage and operates together with accelerator pedal



EC-60 Throttle switch

The following table shows the operational condition of the throttle switch and the current of electricity interconnecting them

Throttle switch	Carburetor throttle valve	Electric current	
		Switch (1)	Switch (2)
	Setting at idle	OFF	ON

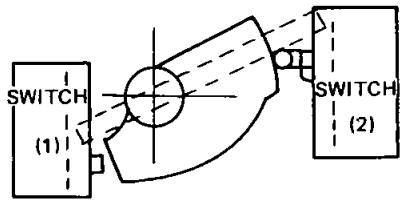
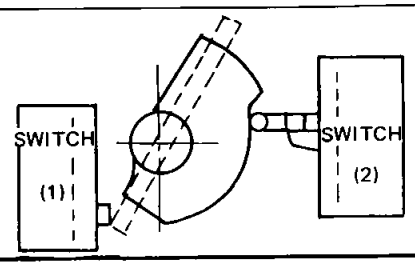
Throttle switch	Carburetor throttle valve	Electric current	
		Switch (1)	Switch (2)
	Open	ON	ON
	Wide open	ON	OFF

Fig EC-61 Operation of throttle switch

In the Datsun PL521 this switch is set to the body of carburetor and is operated by the cam plate connected to the throttle valve shaft The range of "ON" and "OFF" of the throttle switch unit is as illustrated below

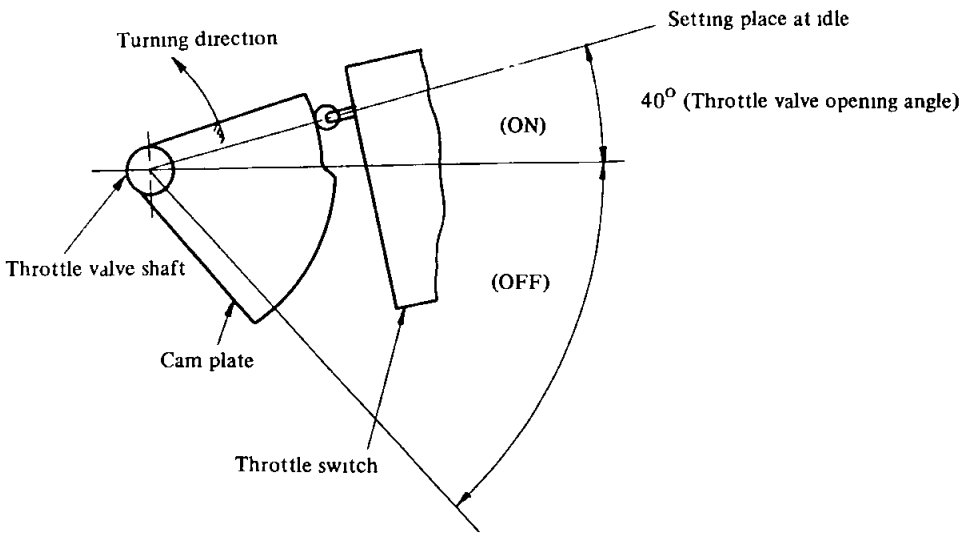


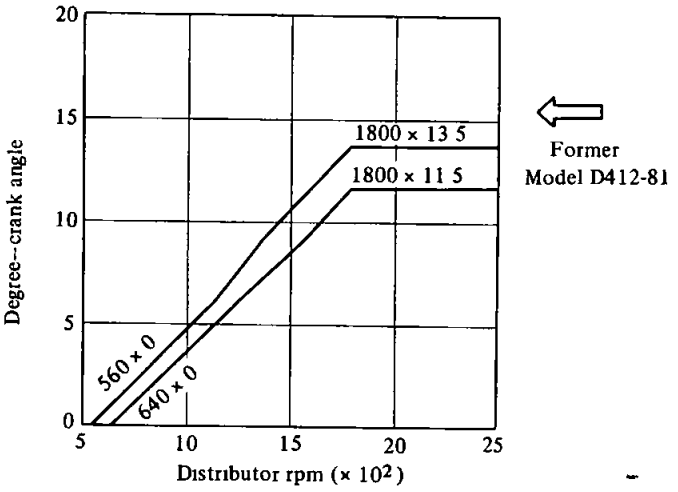
Fig EC-62 Operation of throttle switch (PL521)

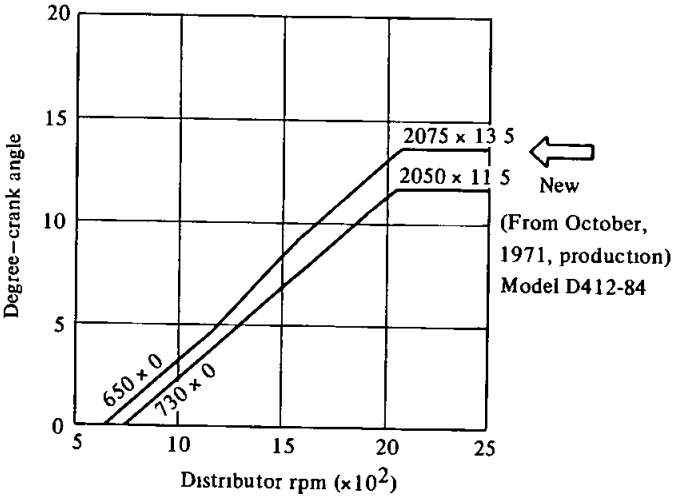
Dual point distributor

The distributor for L16 engine has two breaker points, located opposite each other with a phase difference as shown in Figure EC-63

The difference in phase can be adjusted by the adjusting screw A phase difference of 7 crank angles is adopted

Those two breaker points are placed parallel in the primary ignition circuit The retarded breaker point works when the relay is turned "ON" and the advanced breaker point works when the relay is turned "OFF "





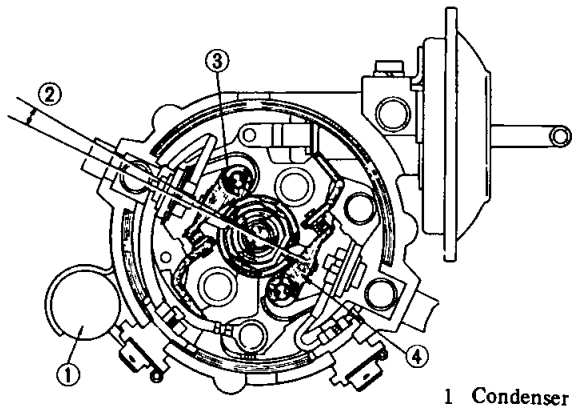


Fig EC-63 Dual point distributor

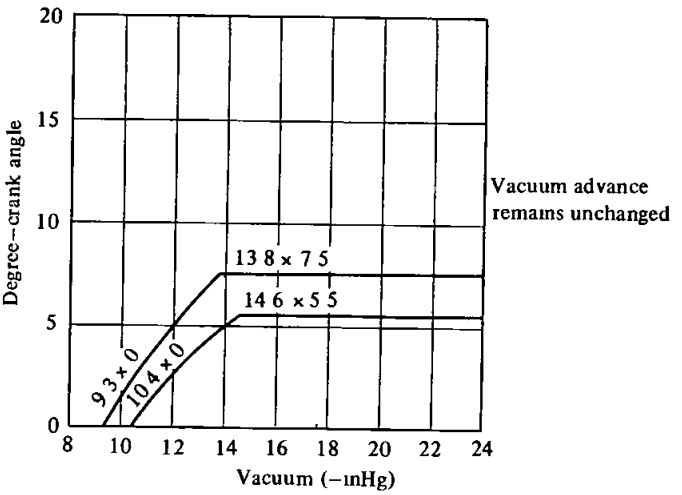


Fig EC-64 Distributor advance characteristics

AUTOMATIC TEMPERATURE-CONTROL AIR CLEANER (A.T.C. AIR CLEANER)

Description

The automatic temperature-control air cleaner always automatically keeps inlet air temperatures constant, and thus makes leaner carburetor calibration possible consistent with good driveability This therefore reduces the exhaust emissions as compared with normal carburetor calibration It also prevents icing in cold weather, improving operating performance

This system employs a special air cleaner equipped with a temperature sensor and an air control valve which is operated by intake manifold vacuum The vacuum at the valve is regulated by the temperature of the sensor.

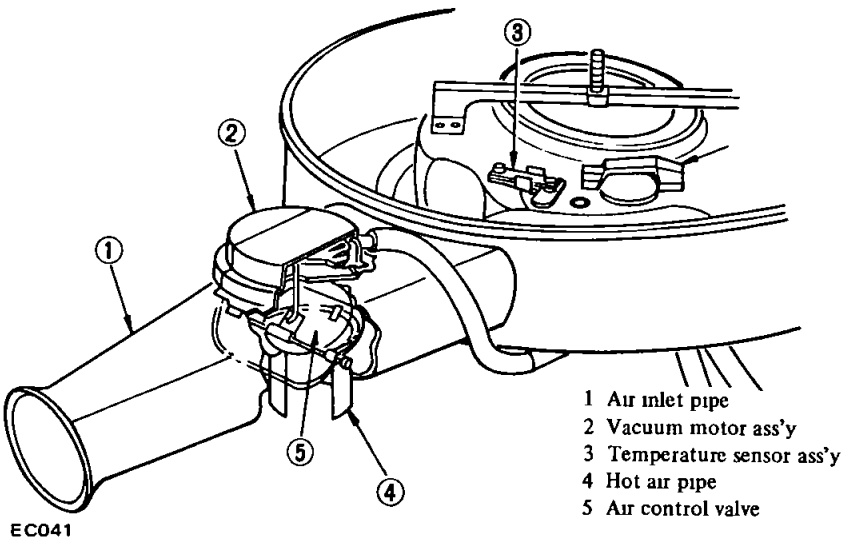
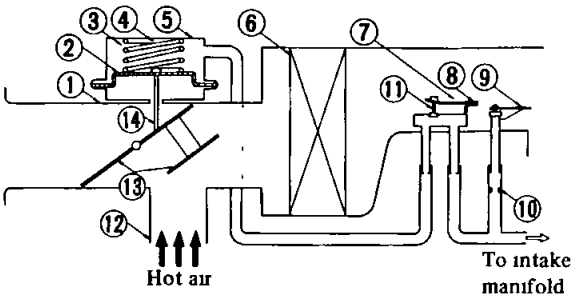


Fig EC-65 Automatic temperature control air cleaner

When air temperature is low with the engine running, the valve so behaves as to close the inlet of underhood air, and introduce hot air via a stove mounted on the exhaust manifold

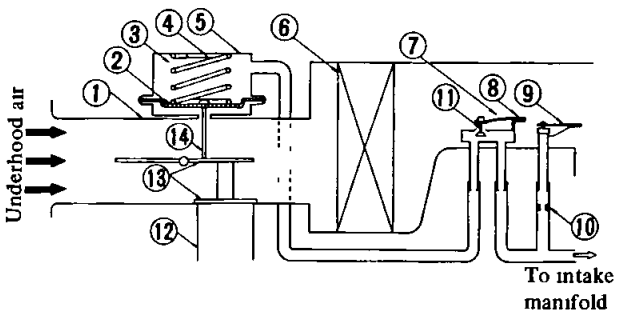


EC042

1 Air inlet pipe
2 Diaphragm
3 Vacuum chamber
4 Diaphragm spring
5 Vacuum motor ass'y
6 Air filter
7 Temperature sensor ass'y
8 Bi-metal
9 Idle compensator ass'y
10 Orifice
11 Air bleed valve (closed)
12 Hot air pipe
13 Air control valves
14 Linkage

Fig EC-66 Hot air delivery mode (During cold engine operation)

When air temperatures become above 100°F, the sensor acts to partially open the valve When air temperature further rises and exceed 118°F the valve fully opens, stopping the supply of hot air and introducing cold air only into the carburetor



EC043

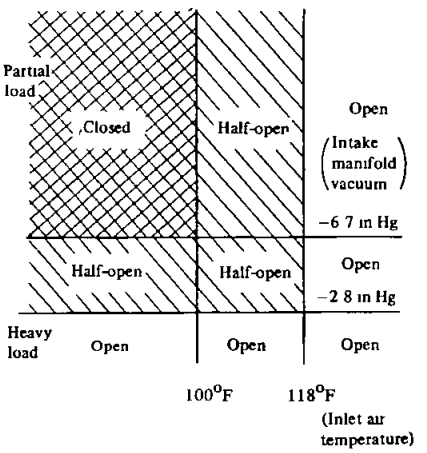
1 Air inlet pipe
2 Diaphragm
3 Vacuum chamber
4 Diaphragm spring
5 Vacuum motor ass'y
6 Air filter
7 Temperature sensor ass'y
8 Bi-metal
9 Idle compensator ass'y
10 Orifice
11 Air bleed valve (open)
12 Hot air pipe
13 Air control valves
14 Linkage

Fig EC-67 Underhood air delivery mode (During hot engine operation)

In this way, the valve automatically mixes underhood air and hot air so as to keep the carburetor air temperature at about 109°F

During heavy throttle operation, the valve operates so as to obtain sufficient power by fully opening the cold-air passage regardless of inlet air temperature

Figure EC-68 shows the state of cold-air passage under various conditions of inlet air temperature and loads



EC044

Fig EC-68 State of cold-air passage

In PL510 and WPL510 models, an idle compensator is provided in this A T C air cleaner. This device is independent of the A T C air cleaner. (The PL521 model for tropical area use is provided with the idle compensator as service)

LEAN CARBURETION

Through the adoption of automatic temperature control air cleaner, the setting of carburetor at leaner mixture ratio has become possible without sacrificing engine performance, with a resultant reduction in the amount of pollutants in exhaust gases Furthermore, a power valve (an enrichment device) has newly been equipped to provide sufficient engine output at wide-open running

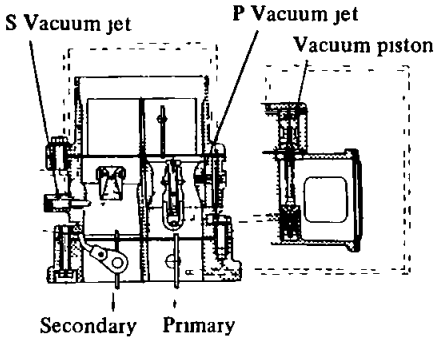
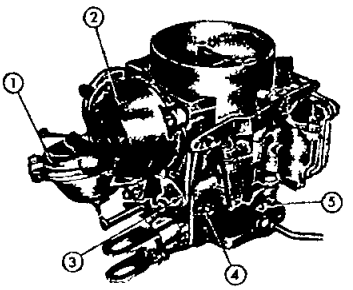
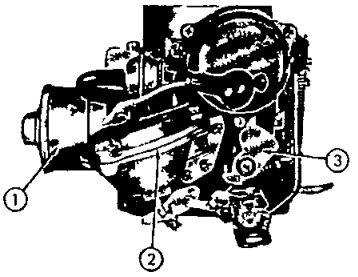


Fig EC-69 Power valve system



1 Secondary diaphragm chamber
2 Bi-metal assembly
3 Fast idle cam
4 Throttle adjusting screw
5 Slow adjusting screw

Fig EC-70 Construction of electric automatic choke



1 B C.D D (control portion)
2 Secondary diaphragm chamber
3 Fast idler cam

Fig EC-71 Construction of electric automatic choke

ELECTRIC AUTOMATIC CHOKE

An electric heater warms a bi-metal interconnected to the choke valve, and controls the position of choke valve and throttle valve in accordance with the elapse of time, or the warm-up condition of engine

The construction and function of each part of this carburetor are as follows (See Fig 70)

1 Bi-metal and heater

Electric current flows through the heater as the engine starts, and warms bi-metal The deflection of bi-metal is transmitted to the choke valve through the choke valve lever

2 Fast idle cam

The fast idle cam determines the opening of throttle valve so as to obtain proper amount of mixture corresponding to the opening of the choke valve which in turn depends upon the warmed-up condition of the engine

3 Fast idle adjusting screw

This screw adjusts the opening of the throttle valve of fast idle cam

4 Unloader

When accelerating the engine during the warm-up period, that is, before choke valve opens sufficiently, this unloader makes the choke valve open to a certain extent so as to obtain an adequate air-fuel mixture

5 Vacuum diaphragm

The moment when engine is ready just after the engine has started by cranking, this diaphragm forces open choke valve to the predetermined extent so as to provide proper air-fuel ratio

6 Bi-metal case index mark

The bi-metal case index mark is used for setting the moment of the bi-metal which controls the air-fuel mixture ratio required for starting

BOOST CONTROLLED DECELERATION DEVICE (B.C.D.D.)

Description

The boost controlled deceleration device (B C D D) serves to reduce HC emissions emitted from engine during coasting

The high manifold vacuum during coasting prevents the mixture from complete combustion because of reduced amount of mixture per cylinder per rotation of engine, with a result that large amount of HC emissions is emitted into the atmosphere

B C D D has been designed based on the idea of eliminating this objection It operates in such a way that, when manifold vacuum exceeds a pre-determined value, it provides an additional mixture of optimum mixture ratio and quantity into the manifold by opening the separate mixture passage in the carburetor Complete combustion of fuel is assisted by this additional mixture, and remarkably reduces the amount of HC contained in exhaust gases

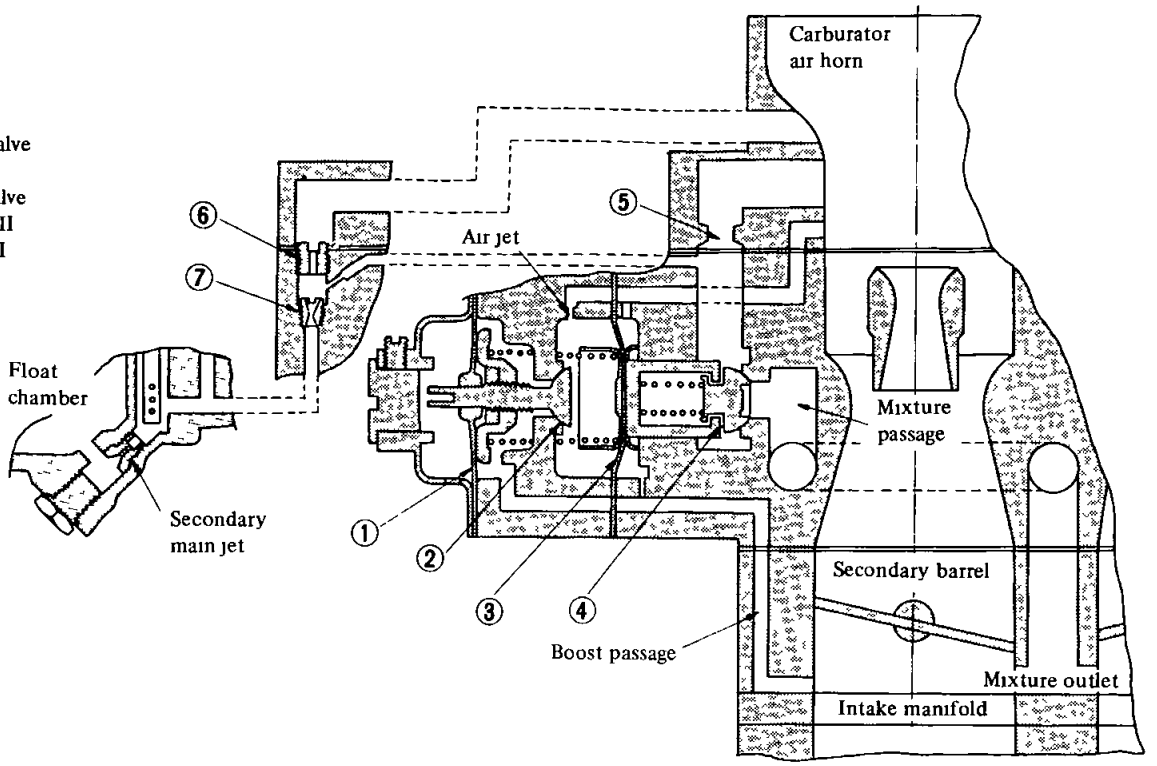


Fig EC-72 Construction of B C D,D

Performance

The diaphragm I ① in Figure EC-72 detects the manifold vacuum and, when the vacuum exceeds a pre-determined value, acts so as to open the vacuum control valve ② This opening makes the manifold vacuum introduce into the second vacuum chamber and actuates the diaphragm II ③

When diaphragm II operates, the mixture control valve ④ opens the passage and introduces the additional mixture into the manifold

The amount of the mixture is controlled by the servo-action of the mixture control valve ④ and vacuum control valve ② so that the manifold vacuum may be kept at the pre-determined value

The amount of mixture mainly depends upon the coasting air bleed II ⑤,while its mixture ratio is determined by the coasting jet⑦and coasting air bleed I ⑥

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION EC-37
Datsun PL510, WPL510 and PL521 EC-37
Flow guide valve EC-38

DESCRIPTION

This system is composed of the following four basic elements

1 Fuel tank with positive sealing filler cap
2 Vapor-liquid separator
3 Vapor vent line
4 Flow guide valve

Datsun PL510, WPL510 and PL521

When the engine is at rest, evaporation gas produced in the closed type fuel tank fills the vapor vent line, vapor liquid separator and fuel tank A flow guide valve opens when the gas pressure is above 0 4 inches Hg The gas passed through the flow guide valve (2) is stored in the crankcase

Once the engine starts operation, evaporation gas in crankcase, manifold and carburetor air cleaner are sucked into the manifold for combustion When the pressure of the closed type fuel tank, vapor liquid separator and vapor vent line becomes negative by decreasing the fuel, the flow guide valve (1) opens to send fresh air from the carburetor air cleaner to the fuel tank

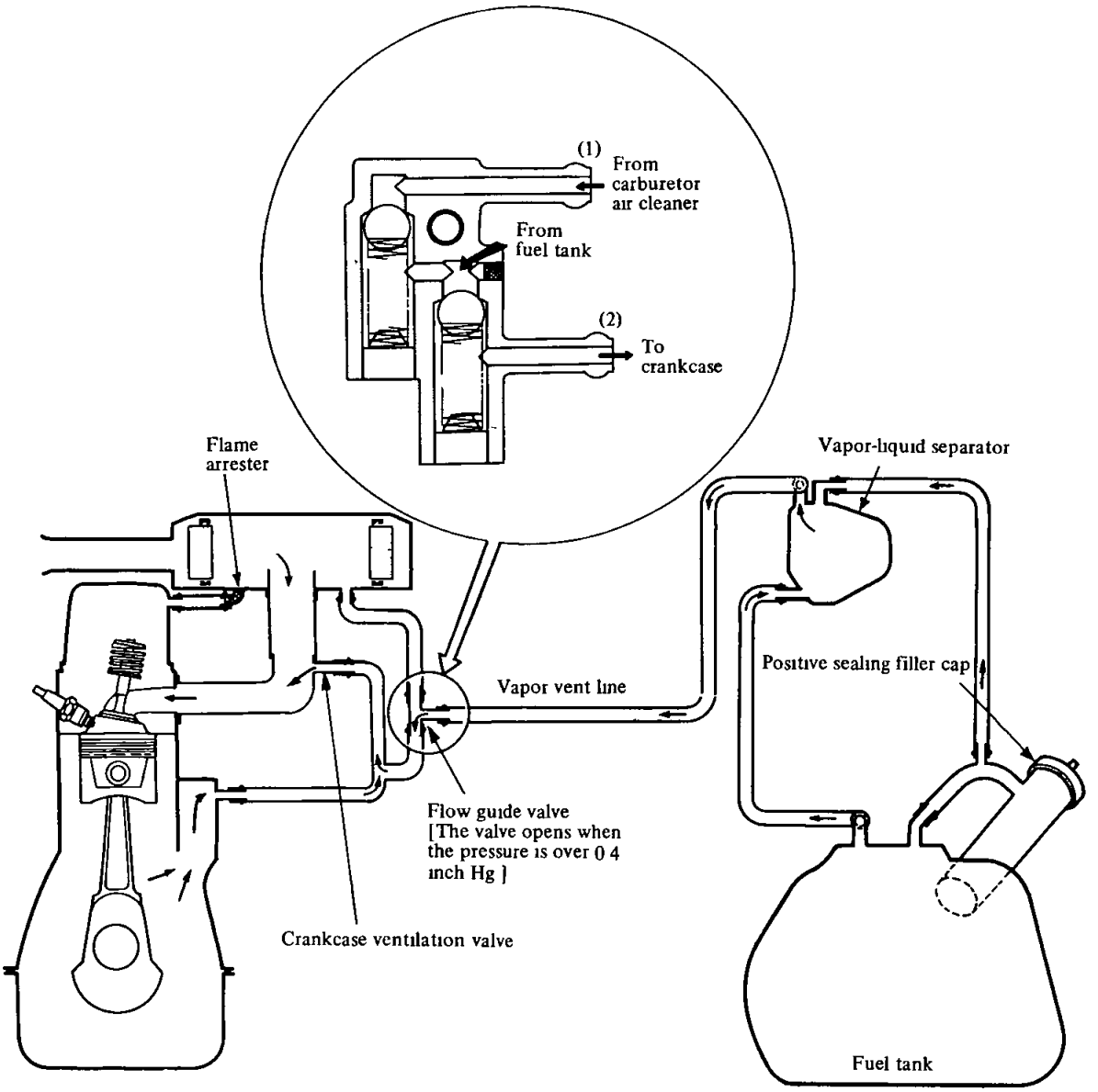


Fig EC-73 Evaporative emission control system point gap

Flow guide valve

This valve operates to prevent the backward flow of blow-by gas from the crankcase and is mounted inside the engine room A,F and C makes are engraved in the body of the valve to indicate the connection of the vapor vent line

TROUBLE DIAGNOSES AND CORRECTIONS

EXHAUST EMISSION CONTROL SYSTEM

Use the following chart as an aid in trouble shooting the exhaust emission control system

Trouble	Possible cause
Excessive backfire exhaust system	Incorrect idle mixture adjustment Defect or malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc) Incorrect ignition timing adjustment
Rough engine idle	Incorrect carburetor adjustment of idle speed, idle mixture, choke setting Leakage of fresh air from the intake manifold Defect or malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc) Incorrect basic ignition timing Incorrect adjustment of cam-to-tappet clearance
Engine surges at all speeds	Incorrect carburetor adjustment of idle speed, idle mixture, choke setting Defect or malfunction of the ignition system (spark plug, high tension cable, breaker point, ignition coil, etc)
Engine stop	Incorrect carburetor adjustment of idle speed, idle mixture, choke setting or dash pot setting (automatic transmission only) Incorrect basic timing Carburetor icing

MAINTENANCE AND TESTING

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- Spark plug EC-40
- Carburetor EC-40
- High tension cable EC-40
- Battery EC-40
- Air cleaner element EC-40

CRANKCASE EMISSION CONTROL SYSTEM EC-40

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GENERAL MAINTENANCE

To make certain that exhaust emissions are maintained at a low level, it is recommended that inspection be basically made every 12 months or every 12,000 miles Best engine operation and minimum exhaust emissions will be obtained with regular inspections and recommended servicing at the specified interval

Distributor

Check the distributor breaker points for abnormal pitting and wear Replace if necessary Make sure that they are in correct alignment for full contact and that point dwell and gap are correct Clean distributor and apply grease to the cam and wick Breaker points should be replaced at intervals not exceeding 12,000 miles

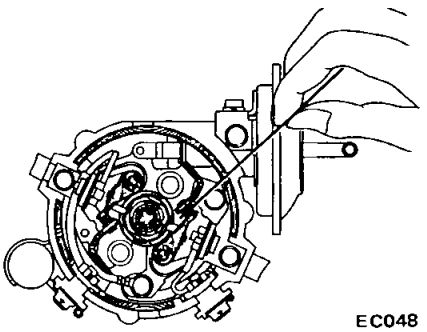


Fig EC-74 Checking of distributor breaker point gap

Spark plug

Remove and clean plugs in a sand blast cleaner Inspect each spark plug Make certain that they are of the specified heat range Inspect insulator for crack and chips Check both center and ground electrodes If they are badly worn, replace with new spark plugs File center electrode flat Set the gap to 0 0315 to 0 0355 inch by using the proper adjusting tool Spark plug should be replaced every 12,000 miles

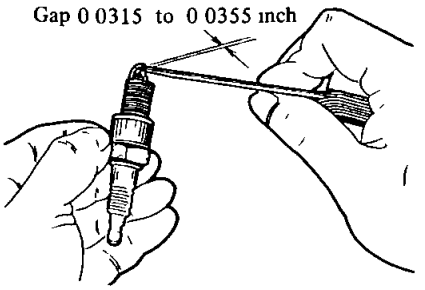


Fig EC-75 Checking of spark plug point gap

Carburetor

Check the choke setting and adjust to specifications as required

Proper carburetor idle mixture adjustment is imperative for best exhaust emission control

Refer to the instructions given under "Setting ignition timing and adjusting idle speed and mixture"

High tension cable

Use an ohmmeter to check resistance on secondary cables Disconnect cables from spark plugs and remove distributor cap from distributor together with the secondary cables Do not remove cables from the cap Connect the ohmmeter between the cable terminal on the spark plug side and the corresponding electrode inside the cap

If the resistance is more than 30,000 ohms, remove the cable from the cap and check the cable resistance only If the resistance is still more than 30,000 ohms, replace the cable assembly

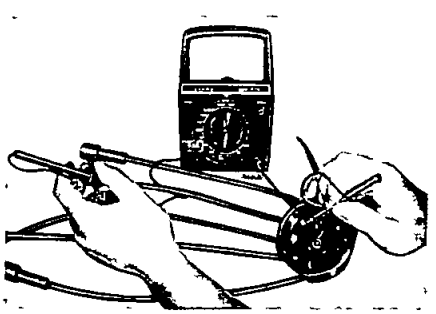


Fig EC-76 Checking of high tension cables

Battery

Test the battery specific gravity with an accurate hydrometer Specific gravity should be at least 1 220 or more with temperature corrections Add distilled water as required to bring fluid to proper level

Clean battery posts and cable terminals. After tightening clamps, coat the battery posts and clamps with light grease to prevent corrosion

Air cleaner element

The paper element has been specially treated, therefore, there is no need to clean it It should be replaced every 24,000 miles

CRANKCASE EMISSION CONTROL SYSTEM

1 Check hoses and hose connections for leaks

2 Disconnect all hoses and blow them out with compressed air

If any hose can not be free of obstructions, replace with a new one

3 Test the crankcase ventilation control valve as follows

With engine running at idle, remove the ventilator hose from the crankcase ventilation control valve If the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over the valve inlet If valve is plugged, do not attempt to clean it Replace with a new valve Check for deposit plugging in the hose Clean if necessary

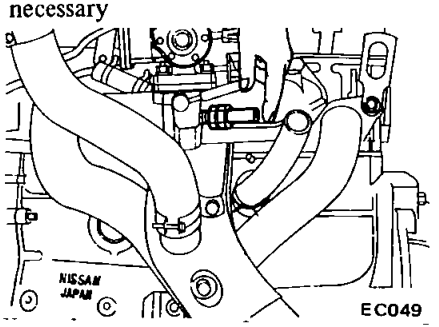


Fig EC-77 Testing of crankcase ventilation control valve

EXHAUST EMISSION CONTROL SYSTEM

Testing of spark advance control system

Datsun PL510, WPL510 and PL521

1 Disconnect the lead wires from the terminal of the distributor, and connect the ammeter between the lead wire for the retarded breaker point and ground

2 Set the ignition key in the "ON" position (Do not start the engine)

3 Make sure that the temperature sensing switch is "ON" and the room temperature is above 50°F Then, check that the ammeter indicates about 3 amperes when the throttle valve is partially opened and the shift lever is in 3rd gear When the throttle valve is wide open or nearly closed, or the shift lever is in a gear postion other than 3rd gear, the ammeter should indicate zero

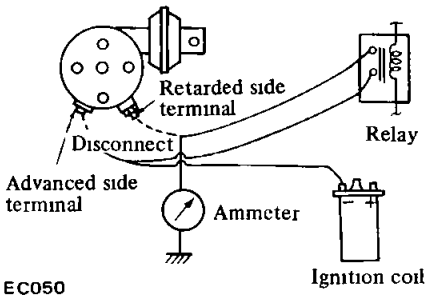


Fig EC-78 Testing of spark advance control system

In case the ammeter indicates zero in step 3

1 Check whether or not relay terminals are loose

2 If they are in correct conditions, disconnect terminals of relay (Datsun PL521) and measure the voltage between terminal (with No 1 punch mark) and "ground" (See Figure EC-79.)

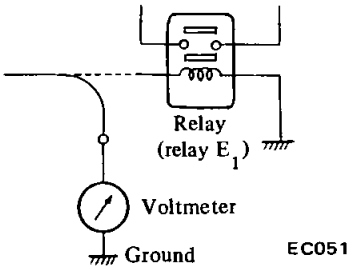


Fig EC-79 Measurement of voltage

3 In case the voltage is approx 12V, relay is defective and must be replaced with a new one

4 In case the voltage is zero, put the relay terminal to the original place

5 Check if the lead wire of each switch is rightly connected to harness

6 If nothing is found wrong, check the continuity of each switch

7. As a result of 6), if the condition of 4) is found, the disconnection of harness is considered Check the continuity of all the switch taking harness off the switch

In case ammeter shows approx 3A

1 In case the electric current is cut when the shift lever is positioned at gear place other than 3rd position, and 3rd gear switch is normal If, however, electric current is not cut, check 3rd gear switch

2 In case the electric current is cut when (a) - the carburetor throttle valve is widely open or (b) - nearly closed, the throttle switch of Datsun PL510 and WPL510 is normal (In case, however, the electric current is not cut, it is abnormal) In case of Datsun PL521, both throttle switch and accelerator switch are normal In case a) is normal and b) is abnormal

(1) In case of Datsun PL510 and WPL510

Check switch II of throttle switch

(2) In case of Datsun PL521

Check accelerator switch

In case b) is normal and a) is abnormal

(1) In case of Datsun PL510, WPL510

Check switch I of throttle switch

(2) In case of Datsun PL521

Check throttle switch

Datsun PL510 and WPL510 with automatic transmission

1 Disconnect the lead wire of the retarded side terminal of the distributor, and connect the ammeter between the lead wire and the retarded side terminal

2 Start the engine, and drive the vehicle on a chassis dynamometer or on the road

3 Make sure that the ammeter does not indicate zero when the vehicle speed is over 13 mph with a partially opened throttle position For other vehicle operations, the ammeter should indicate zero

4 If the system does not work properly, stop the vehicle and inspect the speed switch, the throttle switch and the connection of lead wires at the switches, speed detector and relay

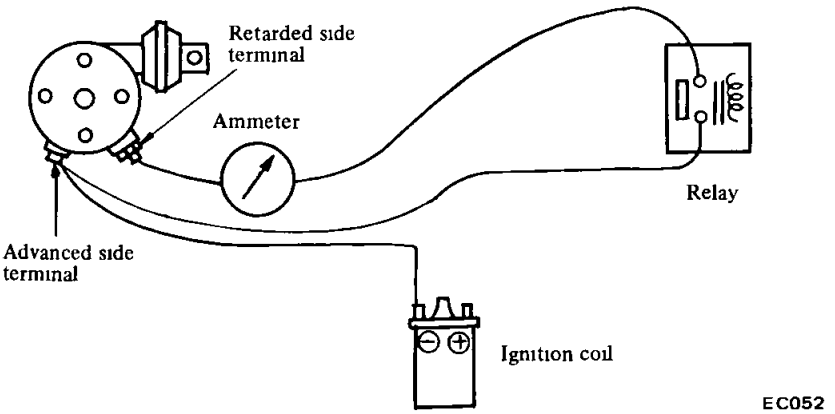


Fig EC-80 Testing of dual point distributor

Testing of accelerator switch (PL521)

1 Make sure of the insulation of the lead wire terminal to the accelerator switch body

2 Disconnect the lead wires at the switch, and connect the ohmmeter to the terminals

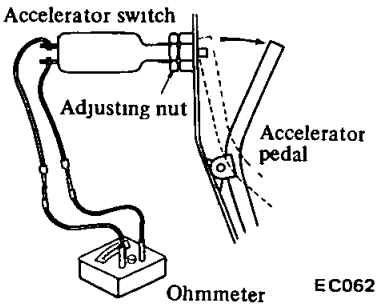


Fig EC-81 Testing of accelerator switch

3 The ohmmeter should indicate infinity (∞) when the accelerator pedal is not depressed, and it should indicate zero when the pedal is depressed

4 If it does not work properly, keep the pedal pressed and push the switch knob several times and conduct the same measurement as indicated in step 3

5 If in the step 4 the switch is found to be functioning well, release the accelerator switch adjusting nut and screw the switch assembly towards the pedal Leave the pedal alone at this point Even when the ohmmeter indicate zero, screw the switch for 1 or 2 turns more and lock it by the adjusting nut

6 If the switch itself is not working well, replace it with a new one

Testing of transmission switch

1 Make sure of the insulation between the lead wire terminal of the transmission switch and the switch body

2 Disconnect the lead wires at the switch, and connect the ohmmeter to the terminals

3 The ohmmeter should indicate zero when the shift lever is in the 3rd gear position And it should indicate infinity (∞) at other gear position including the neutral position

4 If it does not work properly in step 3, replace the switch with a new one

Testing of throttle switch (Datsun PL510 and WPL510)

1 Detach the cover from the throttle switch

2 Make sure that there is a functional sound in the switch when the accelerator pedal is depressed

3 Make sure of the insulation between the lead wire terminals and the base plate of the switch

4 Inspect the clearance between the cam body and the micro switch body with a thickness gauge

5 The clearance should be 0.0315 inch

If it is not over or under 0 0315 inch, loosen the adjusting screws and turn the throttle switch itself so that the clearance may be 0 0315 inch and tighten the adjusting screws

6 Disconnect the coupler and connect the ohmmeter to the terminals (1) and (2), or (1) and (3)

7 The ohmmeter should indicate infinity (∞) when the accelerator pedal is released or depressed fully It should indicate zero when the pedal is partially depressed

8 If the switch does not work well in step 7, replace the switch assembly

9 Install the cover and connect the coupler securely.

1 Adjusting screw
2 Switch (1)
3 Coupler
4 Terminal (3)
5 Terminal (2)
6 Terminal (1)
7 Switch (2)

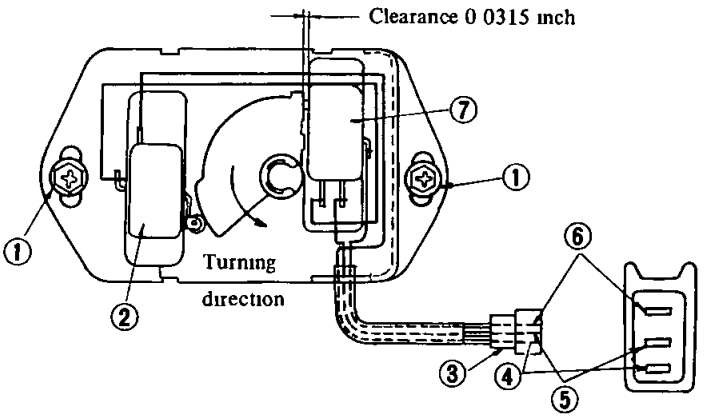


Fig EC-82 Throttle switch

Testing of throttle switch (Datsun PL521)

1 Make sure of the insulation of the lead wire terminal to the throttle switch body

2 Disconnect the lead wires at the throttle switch, and connect the ohmmeter to the terminals

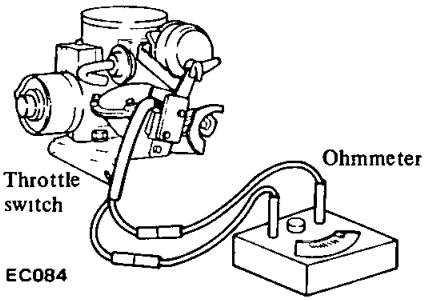


Fig EC-83 Testing of throttle switch

3 The ohmmeter should indicate zero when the throttle valve is closed or partially opened until 40 degrees And it should indicate infinity (∞) when the throttle valve is opened over 40 degrees

4 If it does not function properly, keep the throttle valve closed and push the actuater of the switch several times by finger

5 If the ohmmeter indicates infinity (∞) or zero corresponding with the actuater of the switch being pushed or released, the switch is proper Check and adjust the position of the micro switch by adjusting screw so that the actuater of the micro switch may be allowed to travel 0 03 inch when the cam plate pushes up the actuater

6 If in step 5, the switch is found to be malfunctioning, replace the micro switch with a new one and adjust the position of the new one as mentioned in step 5

Testing of speed switch (PL510 and WPL510 with automatic transmission)

1 Disconnect the lead wires at the speed switch
2 Figure EC-84 is the equivalent electric circuit of the speed switch

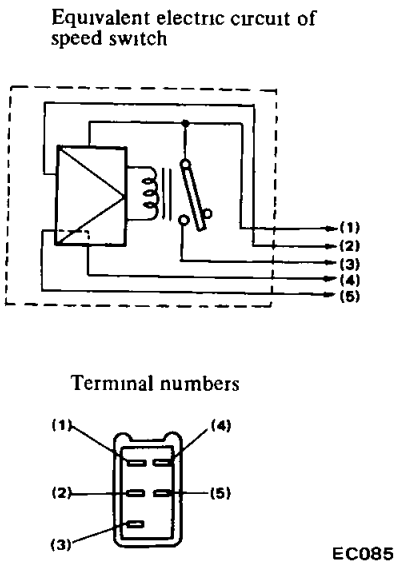


Fig EC-84 Speed switch

Connect the wires between the terminals of the speed switch and the battery terminals as shown in Figure EC-85 Connect the voltage meter to the terminal (3)

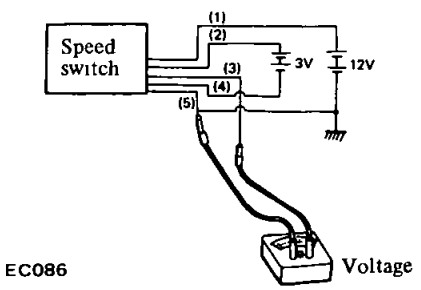


Fig EC-85 Testing of speed switch

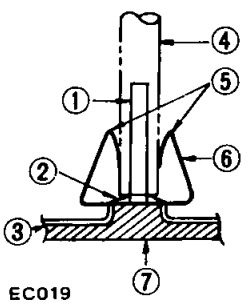
3 The voltage meter should indicate 12 volts
It should indicate zero when the terminal (2) is disconnected from the battery
4 If the switch does not work properly in step 3, detach the cover and inspect the position of the armature and return spring
5 If the position of the armature and return spring is out of order, set them in right position and take the same measurement as indicated in step (3)
6 If it does not work properly in step 5, replace the switch with a new one

Note When a speed switch must be replaced with a new one, replace a speed detector with a new one as the kit of a speed switch and speed detector

AUTOMATIC TEMPERATURE-CONTROL AIR CLEANER

Sensor

Removal



1 Pipe
2 Catch
3 Fixed with adhesive
4 Hose
5 Tab
6 Clip
7 Gasket (rubber)

Fig EC-86 Removal of sensor

1 Flatten the tabs of sensor retaining clip with pliers

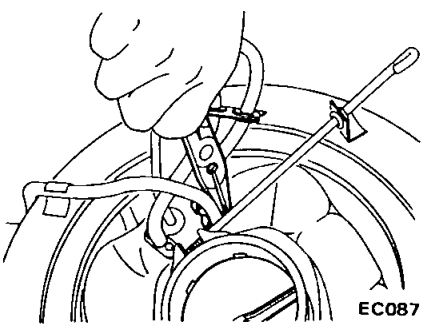


Fig EC-87 Flattening of tabs

2 Pull off hoses

Note Note carefully the respective positions where each hose has been connected

3 Pry up the catches of clip with a screwdriver
4 Take off sensor and clip

Installation

1 Place sensor in correct position
2 Insert clip When doing this, support sensor at its correct position as shown in Figure EC-89 to prevent damage to temperature sensor When placing clip, do it while widening the portion of their tab to facilitate the job

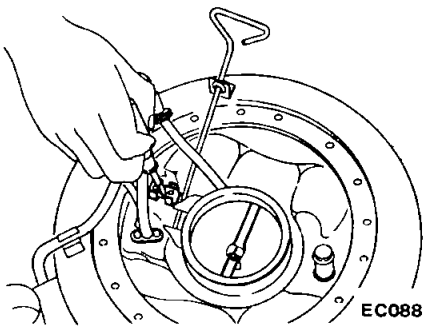


Fig EC-88 Inserting clip

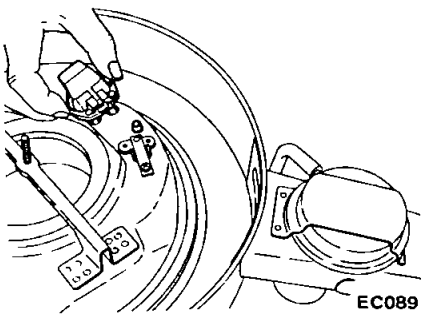


Fig EC-89 Installing sensor

Note Pay particular attention not to damage sensor

3 Reinstall hosed in the same positions as noted in Step 2 under "Removal."

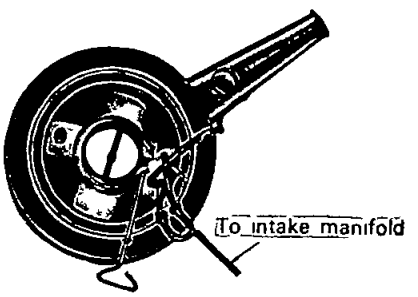


Fig EC-90 Installing hoses

Inspection

Among the possible troubles of this device, the most liable to occur is the permanent opening of valve

This failure will not probably be noticed in warm or hot weather, but in cold weather it may disclose itself as an abnormal performance of engine, such as tardy acceleration, hesitation, or engine stalling When any type of lean operation is perceived, always inspect this device before doing any work on the carburetor

Another trouble which might be expected is that the inlet of underhood-air is kept closed by the valve regardless of the inlet air temperature while the engine is running This trouble will appear as extremely excessive fuel consumption or insufficiency of power

This device should be inspected as follows

Visual check

1 First, inspect whether the hose is connected in the correct position

2 Inspect hose or the like for crack, distortion, clogging or melting

Checking of vacuum motor

1 With the engine shut off, inspect the position of valve (placing a mirror at the end of inlet pipe facilitates the job) The correct condition of valve should be such that it keeps the inlet of underhood-air open and that of hot air closed If otherwise, inspect the linkage of valve

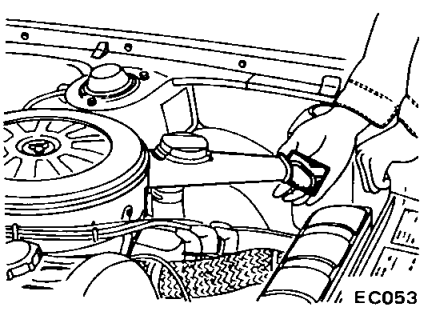


Fig EC-91 Inspecting the position of valve

2 Disconnect the hose of vacuum motor inlet, and directly apply the negative pressure of manifold to the vacuum motor by connecting another hose, sucking by the mouth may substitute for it If the inlet of underhood-air is found to be closed, it shows the correct condition of valve If otherwise, inspect linkage If no defect is found in the linkage, it indicates the trouble of vacuum motor

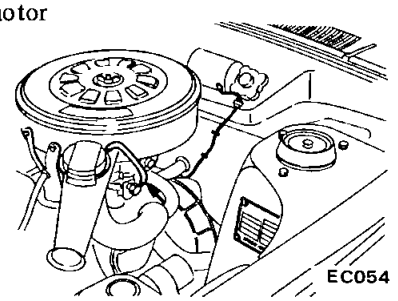


Fig EC-92 Inspecting vacuum motor

3 The valve shows the correct condition if it keeps the inlet of underhood-air closed when the passage in the hose is stopped by bending or clamping it while applying vacuum If otherwise, it indicates that leakage is taking place in vacuum motor

When defect is found at this portion, replace the assembly

Checking of sensor

1 Check the air cleaner with the engine running below 86°F Make sure that the engine is cooled down before test is conducted

2 Assure yourself of valve position before starting It is correct if the inlet of the underhood-air side is fully open

3 Start engine, and operate idling It indicates the correct condition of valve if the inlet of underhood-air becomes fully closed immediately after starting

4 Carefully watch the valve to ascertain that it gradually begins to open as the engine warms up But, when the ambient temperature is low it takes considerable length of time for the valve to begin to open or it hardly opens This should not, however, be regarded as trouble

If the valve does not operate satisfactorily or if any doubt is left as to its operation, further conduct the following test

5 Remove the air cleaner cover, and stick a thermister or a small thermometer as close to the sensor as possible with tape or the like Place the air cleaner cover again

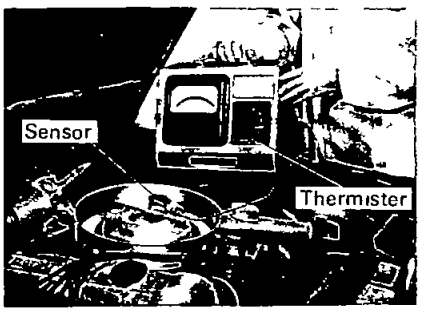


Fig EC-93 Checking sensor

6 Start the engine and continue idling in accordance with the description given under paragraphs (1), (2) and (3) above When several minutes have passed and the valve is partially opened, read the thermister indication It is correct if the reading falls between 86°F and 126°F If the thermister reads widely apart from this range, replace the sensor

7 With the engine which is equipped with an idle compensator, do as follows before replacing sensor

Clog the hose of idle compensator side by bending or clamping it, and check the temperature following the procedure as given in paragraphs (5) and (6) above. If the thermister reads correct temperature, replace the idle compensator, if it reads widely different, replace the sensor

ELECTRIC AUTOMATIC CHOKE

Adjustment

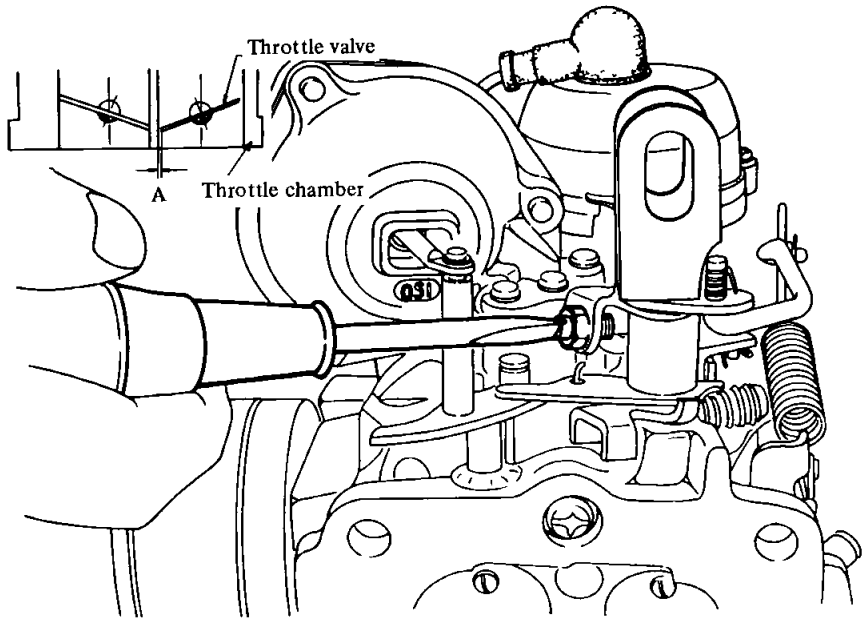
Fast idle adjustment

Place fast idle arm on the first step of fast idle cam Then adjust fast idle adjusting screw in such a way that the clearance of throttle valve (shown at "A" in the illustration) will be 0 047 inch for manual transmission car, and 0 055 inch for automatic transmission car

Notes

a. If engine speed does not rise sufficiently and is unstable after starting, adjust the clearance until there exists a clearance of 0 008 inch wider than the specified value

b If engine over-speeds after starting, adjust until the clearance becomes narrower by 0 008 inch than the specified value



EC055

Fig EC-94 Fast idle adjustment

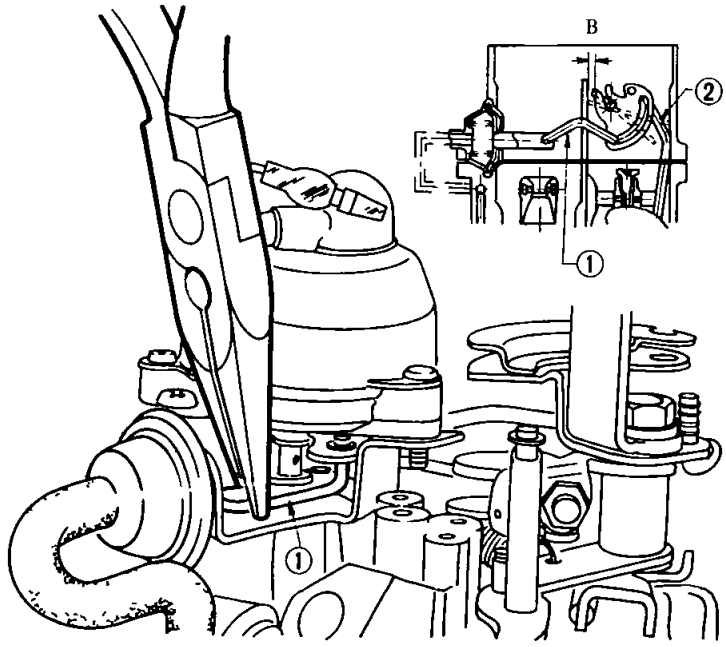
Vacuum break adjustment

1 Completely close choke valve

2 Hold choke valve by stretching a rubber band between choke shaft lever and the stationary part of carburetor

3 Grip vacuum break rod with pliers, and pull straight fully

4 Under this condition, adjust the gap (shown by "B" in the illustration) between choke valve and carburetor body to 0 087 inch by bending vacuum brake rod



1 Vacuum break rod
2 Choke valve

EC056

Fig EC-95 Vacuum break adjustment

Choke unloader adjustment

1 Completely close choke valve
2 Hold choke valve by stretching a rubber ring between choke shaft lever and the stationary part of carburetor
3 Open throttle lever until it fully opens
4 Under this condition, adjust the clearance "C" in the illustration between choke valve and carburetor body to 0 205 inch by bending unloader tongue

Note Make sure that the throttle valve opens when the carburetor is mounted on the car
If the throttle valve fails to open, the unloader becomes inoperative, resulting in poor acceleration after the engine is started

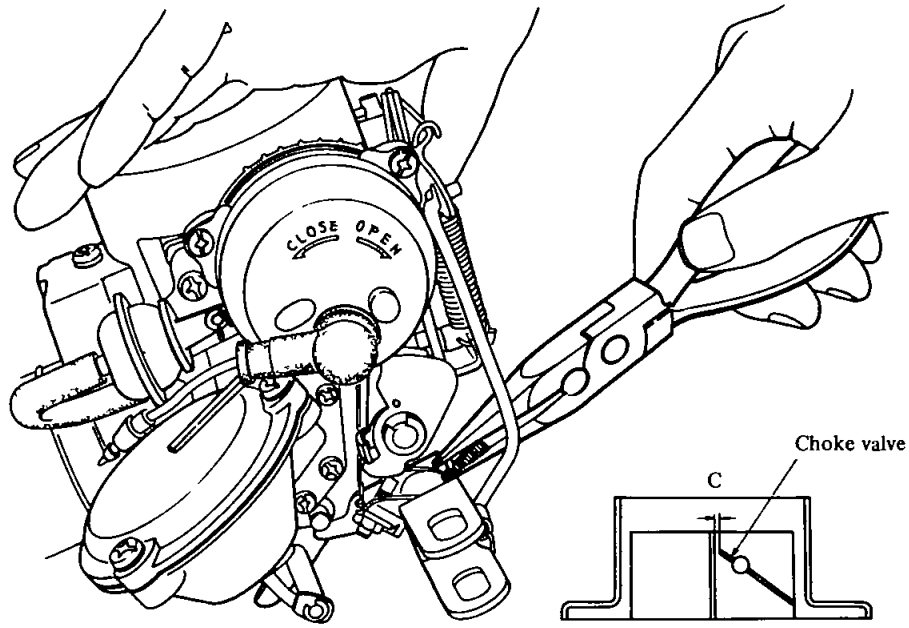


Fig EC-96 Choke unloader adjustment

Dash pot adjustment (Automatic transmission cars only)

1 It is necessary that the idling speed of engine and mixture have been well tuned up and engine is sufficiently warm
2 Turn throttle valve by hand, and read engine speed when dash pot just touches the stopper lever
3. Adjust the position of dash pot by turning nut until engine speed is in the range of 2,400 to 2,500 rpm.
4 If a tachometer is not available, adjust as follows

Locate F I adjusting screw on 2nd-stage (13°) of the F I cam Make sure that the tip of dash pot closely touches stopper lever

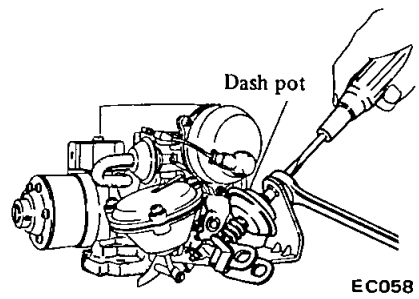


Fig EC-97 Dash pot adjustment

Bimetal setting

1 Measurement of bi-metal heater resistance

Install the bi-metal cover in place on the carburetor Make sure that the resistance across the terminal and the carburetor body is in the range of 9 8 to 10 2 ohms Measure the resistance without the flow of electric current through heater and at about 70°F

Note Use an accurate measuring instrument, such as a wheatstone bridge

2 Bimetal cover setting

Position bimetal cover until the index mark is aligned at the middle point of the scale

Note When somewhat over-choked, set bi-metal cover after turning it clockwise by about one division of the scale graduations

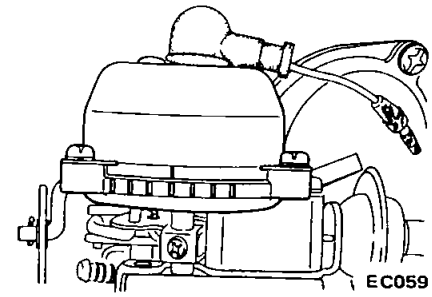


Fig EC-98 Bi-metal cover setting

BOOST CONTROLLED DECELERATION DEVICE

Adjustment of operating pressure of B. C. D. D.

Prepare the following tools:

1 A tachometer to measure the engine speed while idling, and a screwdriver
2 A vacuum gauge and connecting pipe

Notes

a A quick-response type boost gauge such as Bourdon's tube type is recommended, mercury-type manometer should be avoided
b Special tools are not required

Warming-up operation

Continue warming-up operation until the engine reaches its normal operating temperature

Connecting vacuum gauge

Connect rubber hose between vacuum gauge and intake manifold as shown

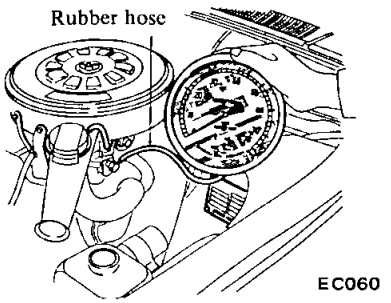


Fig EC-99 Connecting vacuum gauge

Adjustment of idling

Adjust the engine at normal idle setting

	Idle engine speed	Ignition timing	CO
A/T vehicle	600 rpm/D" range	7° BTDC	2%
M/T vehicle	700 rpm/neutral	7° BTDC	2%

Racing

Raise the engine speed up to 3,000 to 3,500 rpm under no-load, and close the throttle valve by releasing it from hand At this moment, the negative pressure of manifold rises (above −23 6 in Hg) and then gradually falls down to the pressure of idling (about −19 7 in Hg)

The process of this pressure fall takes one of the three forms as illustrated in Figures EC-100, EC-102 and EC-103 according to the difference of the operating pressure of B C D D

Excessive operating pressure of B.C.D.D.

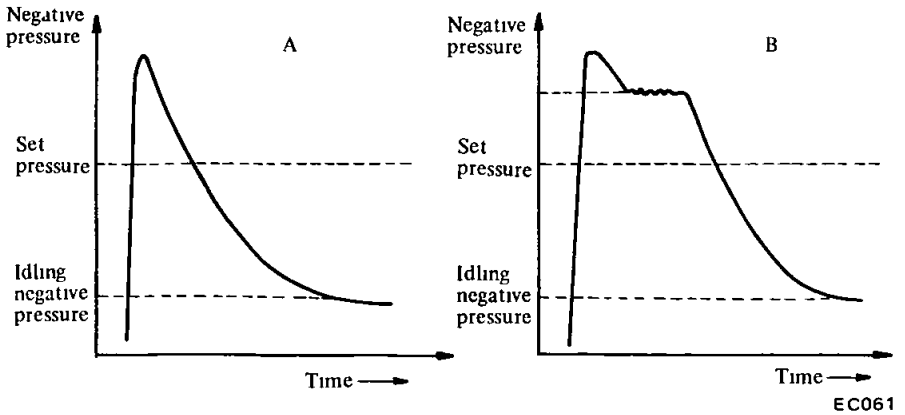
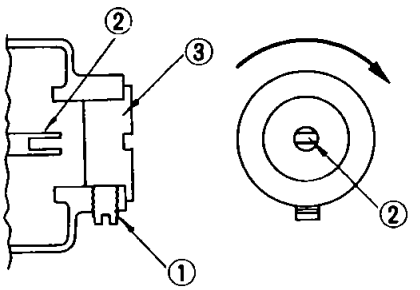


Fig EC-100 Characteristic curve—high negative pressure

1 When the operating pressure is too high, B C D D remains inoperative, and negative pressure decreases without being sustained while it is falling, just like that of the engine on which a B C D D is absent See diagram (A)
2 When the operating pressure is lower than that of the case of (A) but is higher than the set pressure The negative pressure which has once risen is kept constant at a certain value (operating pressure) for about one second, and then gradually falls down to the idling negative pressure See diagram (B)

When the operating pressure is too high



1 Lock screw "L"
2 Adjusting screw "S"
3 Cover "C"

Fig EC-101 Adjusting operating pressure

Tighten adjusting screw "S" as outlined below until correct pressure is obtained Loosen lock screw "L " Adjusting screw "S" is accessible after detaching cover "C " Slightly turn this adjusting screw clockwise and then race engine Do not fit tip of screw driver tightly in screw slot

Notes

a Turning adjusting screw "S" one-eighth rotation in either direction will cause a change in operating pressure of 0 79 inch Hg This adjusting screw is left-hand threaded

b Turn adjusting screw "S" counterclockwise to increase the negative pressure (from −21 26 to −22 05 inch Hg, for example).

c Turn adjusting screw clockwise to decrease the negative pressure (from −22 05 to −21 26 inch Hg, for example)

Insufficient operating pressure of B.C.D.D.

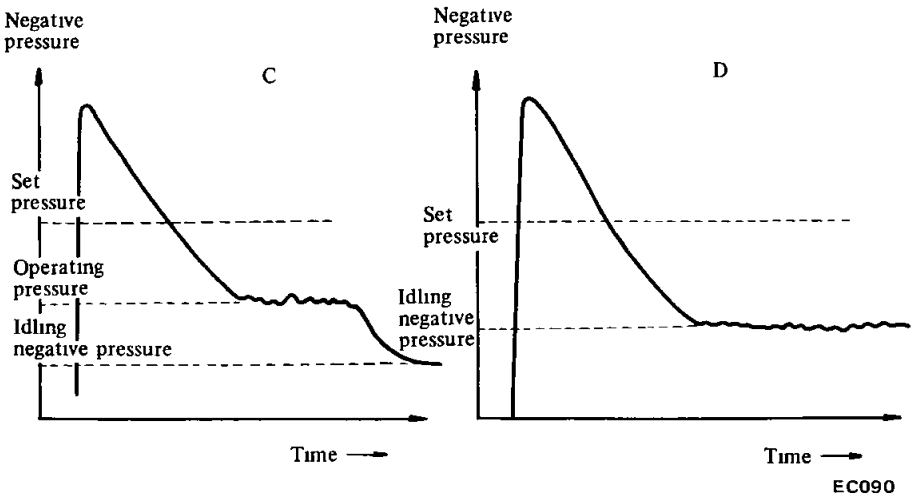


Fig EC-102 Characteristic curve—low negative pressure

1 When the operating pressure is somewhat low, the negative pressure becomes constant for some while at a value below set pressure, and then falls down to idling negative pressure See diagram (C)

2 When the operating pressure is exceedingly low, the negative pressure will not fall down to idling pressure and the speed of engine is not restored to idling speed (under this condition, the engine speed never reaches above 2,200 rpm)

In extreme cases, the engine speed fails to attain idling speed although the negative pressure becomes equal to that of idling See diagram (D)

When the operating pressure is too low

Loosen adjusting screw "S" as outlined below until correct pressure is obtained Loosen lock screw "L " Adjusting screw "S" is accessible after detaching cover Slightly turn this adjusting screw counterclockwise and then race the engine Do not fit tip of screw driver tightly in screw slot

When operating pressure equals set pressure

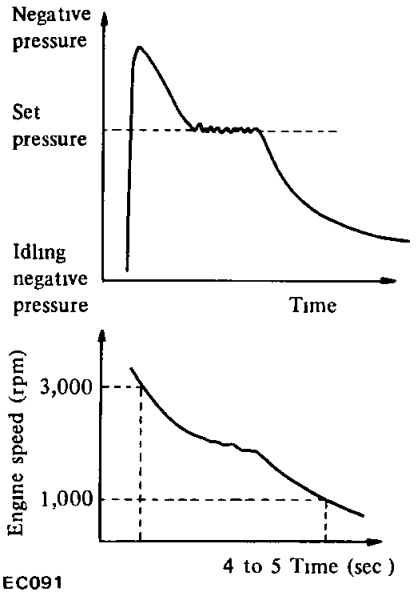


Fig EC-103 Characteristic curve —proper negative pressure

The manifold vacuum after racing once remains constant at set pressure and then falls down to idling pressure In this case, it takes from 4 to 5 seconds for the engine speed to decrease from 3,000 rpm to 1,000 rpm

Set pressure

Manual transmission vehicle
−21 85 to −22 44 inch Hg

Automatic transmission vehicle
−21 06 to −21 65 inch Hg

When the operating pressure is equalized to set pressure, install cover "C" and tighten lock screw "L" securely

Testing of speed switch (PL510 and WPL510 with A/T)

Refer to the instructions under "Testing of speed switch (PL510 and WPL510 with automatic transmission) " (Page EC-43)

EVAPORATIVE EMISSION CONTROL SYSTEM

Checking of fuel tank, vapor-liquid separator and vapor vent line

1 Check all hoses and fuel tank filler cap

2 Disconnect the vapor vent line connecting flow guide valve to vapor-liquid separator

3 Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way change cock) to the end of the vent line

4 Supply fresh air into the vapor vent line through the cock little by little until the pressure becomes 14 5 inch Aq

5 Shut the cock completely and leave it that way

6 After 2 5 minutes, measure the height of the liquid in the manometer
7 Variation of height should remain within 1 0 inch Aq
8 When the filler cap does not close completely the height should drop to zero in short time
9 If the height does not drop to zero in a short time when the filler cap is removed, it is the cause of the clogged hose

Note In case the vent line is clogged, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock It must therefore be repaired or replaced

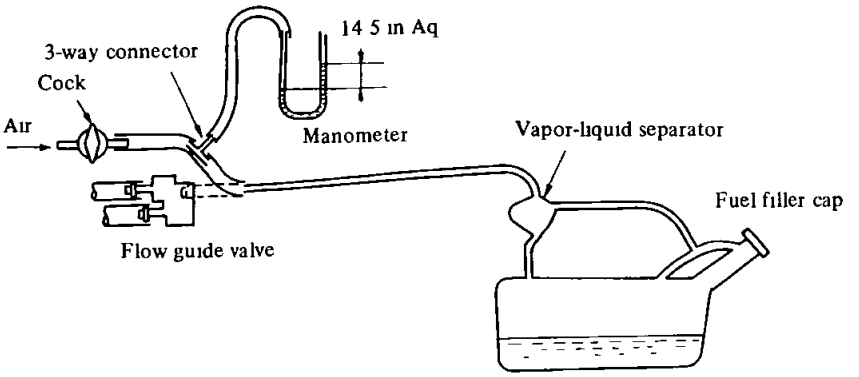


Fig EC-104 Checking of evaporative emission control system

Checking of flow guide valve

1 Disconnect all hoses connected to the flow guide valve
2 While lower pressure air is pressed into the flow guide valve from the ends of vent line of fuel tank side, the air should go through the valve and flow to crankcase side If the air does not flow the valve should be replaced
But when the air is blown from crankcase side, it should never flow to the other two vent lines
3 While the air is pressed into the flow guide valve from carburetor air cleaner side, it flows to the fuel tank side and/or crankcase side
4 This valve opens when the inner pressure becomes 0 4 inch Hg In case of improper operations or breakage, replace it

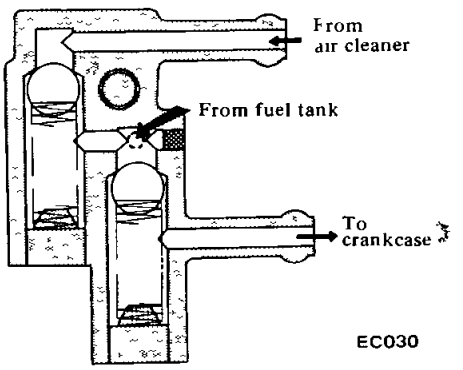


Fig EC-105 Flow guide valve

TESTING IGNITION TIMING, ADJUSTING IDLE SPEED AND MIXTURE

Engine tune-up must be done according to Nissan Specifications with the necessary equipment as recommended But the following procedures are recommended for Datsun PL510, WPL510 and PL521 in setting ignition timing and adjusting idle speed and mixture If these procedures are taken, the emission will be controlled below the maximum allowable level

Datsun PL510, WPL510 and PL521

1 Install the air cleaner
2 Warm up the engine thoroughly with the transmission in the neutral gear position
3 Connect ignition tachometer and timing light
4 Set the idle speed at about 700 rpm
5 Adjust the ignition timing at 7° BTDC by conventional method
6 Operate the engine at 2,000 rpm for about 15 seconds under no-load condition
7 Run the engine at idle for one minute
rpm (770 rpm for the automatic transmission vehicle) by the throttle adjusting screw and idle adjusting screw

9 Set the engine speed at 700 rpm (720 rpm for the automatic transmission vehicle) by turning the idle adjusting screw clockwise for a leaner mixture

10 Connect the lead wire between the advanced and the retarded side terminals of the distributor The engine speed should drop by about 100 to 150 rpm

11 Check ignition timing by timing light The timing should be at TDC

12 If the timing is not correct, stop the engine and adjust the position of the retarded breaker point

13 Start the engine and check the ignition timing

14 If the timing is not at TDC, repeat steps 12 and 13 above until it becomes TDC

15 Disconnect the lead wire between the advanced and the retarded side terminals of the distributor

16 Check the ignition timing The timing should remain 7° BTDC If the timing is not correct, repeat steps 5 through 15 above

17 On the automatic transmission model, idle speed becomes about 600 rpm when gear position is set to "Drive"

Notes

a In case ignition timing is checked, the adjustment of the point gap of the spark plug described in "general maintenance" must be made at the same time Make the point gap adjustment first since the ignition timing changes when it is made after the ignition timing is adjusted

b If you set the idle speed and mixture by using CO meter, the following procedure should be done after step 7 above

(1) Set the idle speed at 700 rpm (720 rpm for the automatic transmission vehicles) by turning the throttle adjusting screw

(2) Adjust the percentage of the carbon monoxide to 2 0% at 700 rpm (720 rpm for automatic transmission vehicles) by turning the idle adjusting screw and throttle adjusting screw

(3) Check the ignition timing Timing should remain 7°BTDC at 700 rpm (720 rpm for automatic transmission vehicles)

(4) Adjust the engine speed at 700 rpm (600 rpm for automatic transmission vehicles at drive range) by the throttle adjust screw

SERVICE MANUAL

EMISSION CONTROL SYSTEM

SECTION L24

L24 ENGINE

L24

GENERAL DESCRIPTION	EC-53
CRANKCASE EMISSION CONTROL SYSTEM	EC-54
EXHAUST EMISSION CONTROL SYSTEM	EC-54
EVAPORATIVE EMISSION CONTROL SYSTEM	EC-64
MAINTENANCE AND TESTING	EC-66
ADJUSTING ENGINE IDLING SPEED AND GAS MIXTURE	EC-71
TROUBLE DIAGNOSES AND CORRECTIONS	EC-74

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

L24 ENGINE

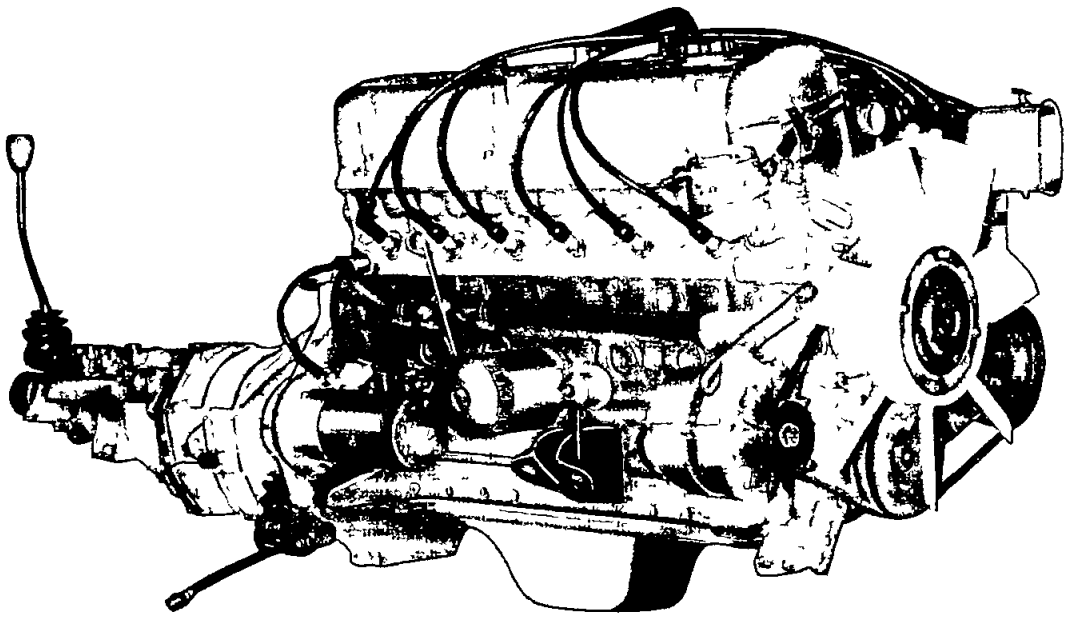


Fig EC-106 External view

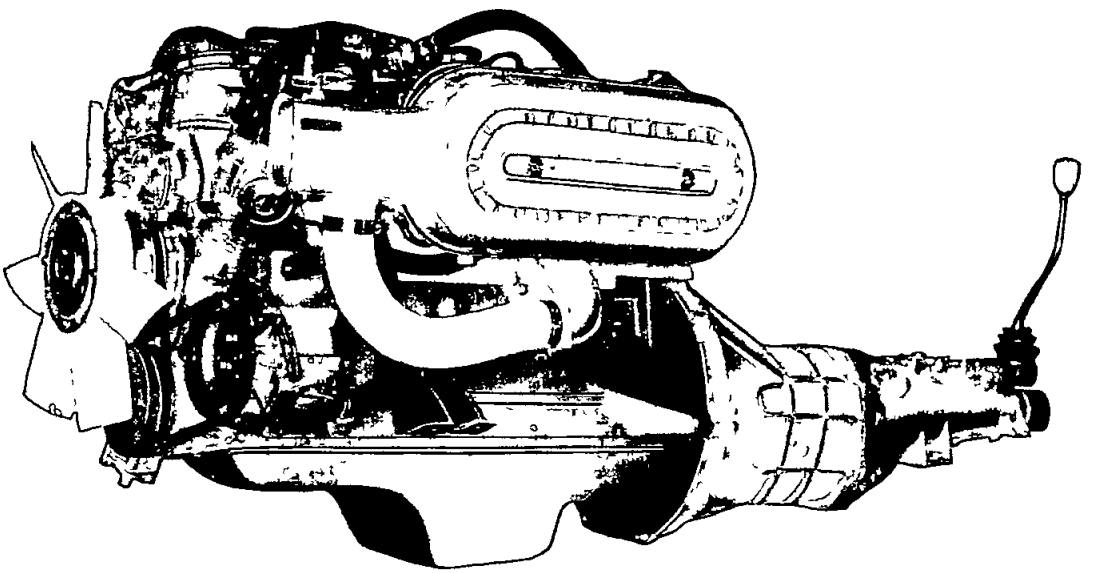


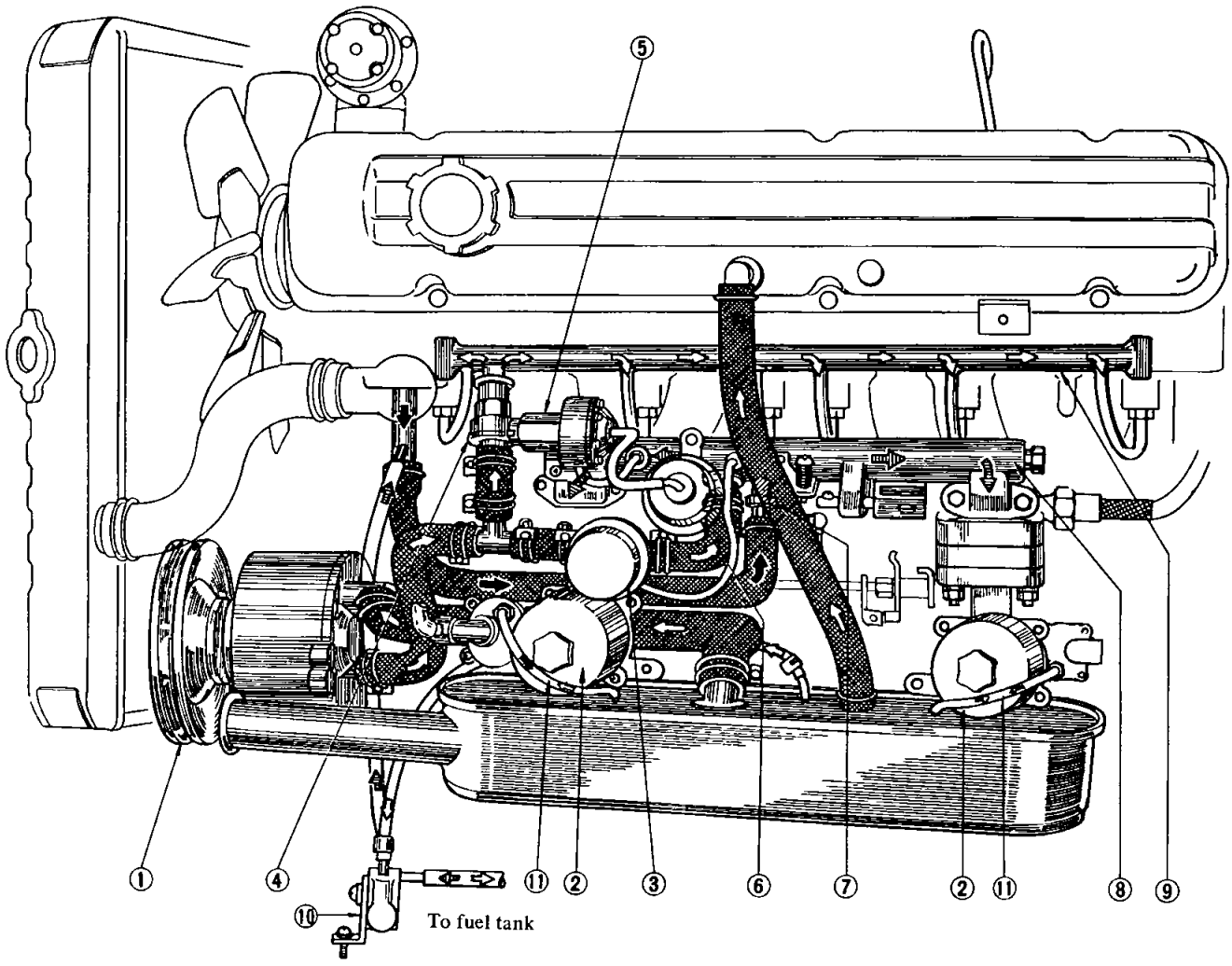
Fig EC-107 External view

GENERAL DESCRIPTION

There are three types of emissions to be controlled The control systems are,

1 Closed type crankcase emission control system
2 Exhaust emission control system
Air injection system (A I S)
Engine modification system
3 Evaporative emission control system

Periodic inspection and required servicing of these systems should be carried out at the recommended intervals to reduce harmful exhaust gas emissions to a minimum



EC064

1 Air pump
2 Carburetor
3 A B valve
4 Check valve
5 Control valve
6 Servo diaphragm
7 Emission control valve
8 Balance tube
9 Air gallery pipe
10 Flow guide valve
11 Rubber tube

Fresh air
Blow-by gas
Mixed air or evaporation gas

Fig EC-108 Emission control system on model S30 series

CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

This system returns blow-by gas to both the intake manifold and carburetor air cleaner

A variable orifice valve is used to feed crankcase blow-by gas to the intake manifold During partial-throttle operation of the engine, the intake manifold sucks the blow-by gas through the valve Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air Ventilating air is drawn from the clean side of the carburetor air cleaner, through the tube connection, into the crankcase

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and the flow goes through the sealed system in the reverse direction In vehicles with an excessively high blow-by, some of the flow will go through the tube connection to the carburetor air cleaner at all conditions

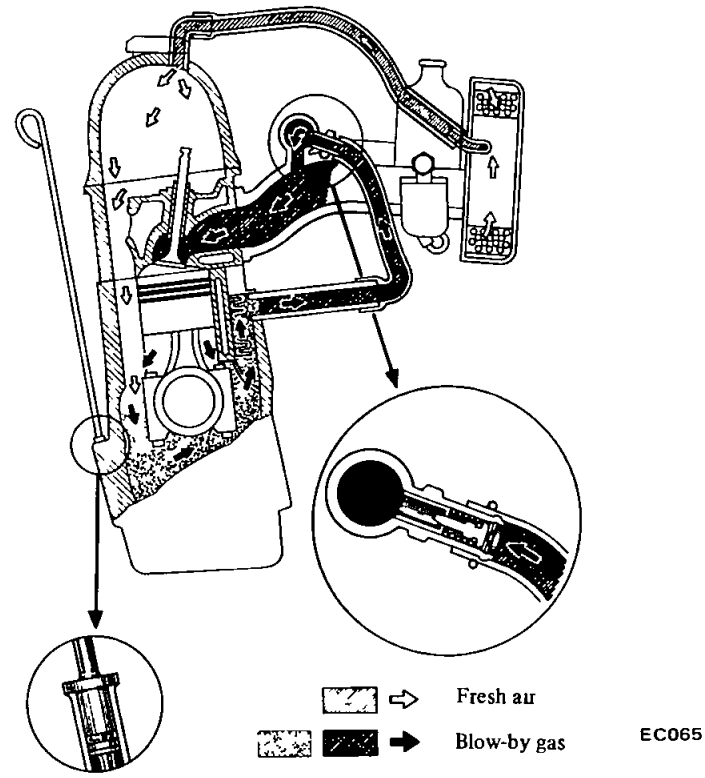


Fig EC-109 Closed type positive crankcase ventilation system

PERIODIC SERVICE

Once a year or every 12,000 miles, the crankcase emission control system should be serviced as follows

1 Check hoses and hose connectors for leaks

2 Disconnect all hoses and blow them out with compressed air

If a hose is not free from obstructions, replace with a new one

3 Check the crankcase ventilation control valve for the correct function If the valve is found defective, replace it with a new assembly

EXHAUST EMISSION CONTROL SYSTEM

CONTENTS

AIR INJECTION SYSTEM	EC-55	Check valve	EC-60
Air pump	EC-55	Air gallery pipe and injection nozzles	EC-60
Air injection into each exhaust port	EC-56	ENGINE MODIFICATIONS	EC-60
Anti-backfire valve	EC-57	Throttle opener	EC-60
Check valve	EC-57	Dual point distributor for automatic transmission	EC-61
Air pump relief valve	EC-57	Manifold heat control thermostat	EC-62
REMOVAL, DISASSEMBLY AND INSPECTION	EC-57	Hot-air air cleaner	EC-63
Air pump	EC-57	Temperature control of SU-type carburetor by engine coolant	EC-63
Drive pulley	EC-60		
Anti-backfire valve	EC-60		

AIR INJECTION SYSTEM

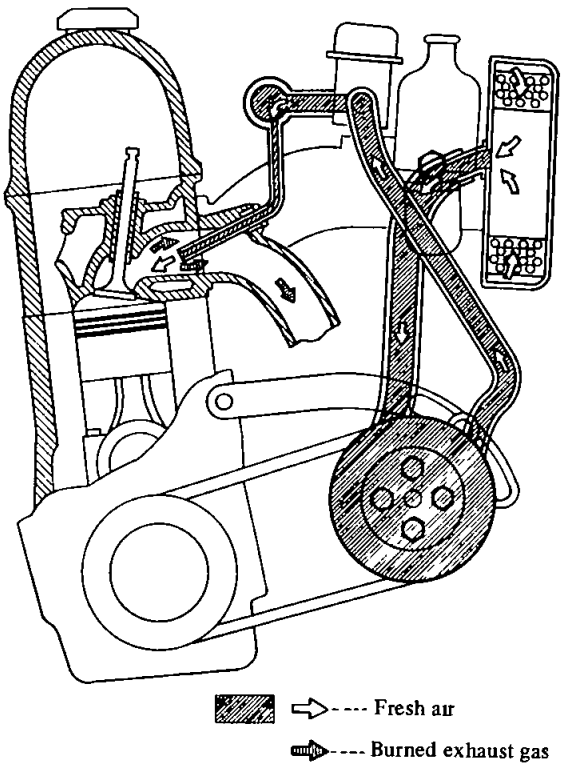


Fig EC-110 Air injection system

The air injection pump receives clean air through a hose, connected to a fitting attached beneath the carburetor air cleaner

This rotary vane type pump has been designed to draw air in and compress it to produce maximum air flow with quiet operation A fresh air line from the air injection pump is routed to a check valve, which prevents exhaust gas from entering the air pump in the event exhaust manifold pressure is greater than air injection pressure, or in the case of an inoperative pump The compressed fresh air is injected through an injection nozzle to the exhaust ports

An anti-backfire valve has been used to eliminate "popping" in the exhaust system when the throttle is closed at high speed "coasting." Controls which have been incorporated to assure reliable system operation include an anti-backfire valve and a check valve

Air pump

The air pump is of a three-vane type It is a positive displacement vane type which requires no lubricating service

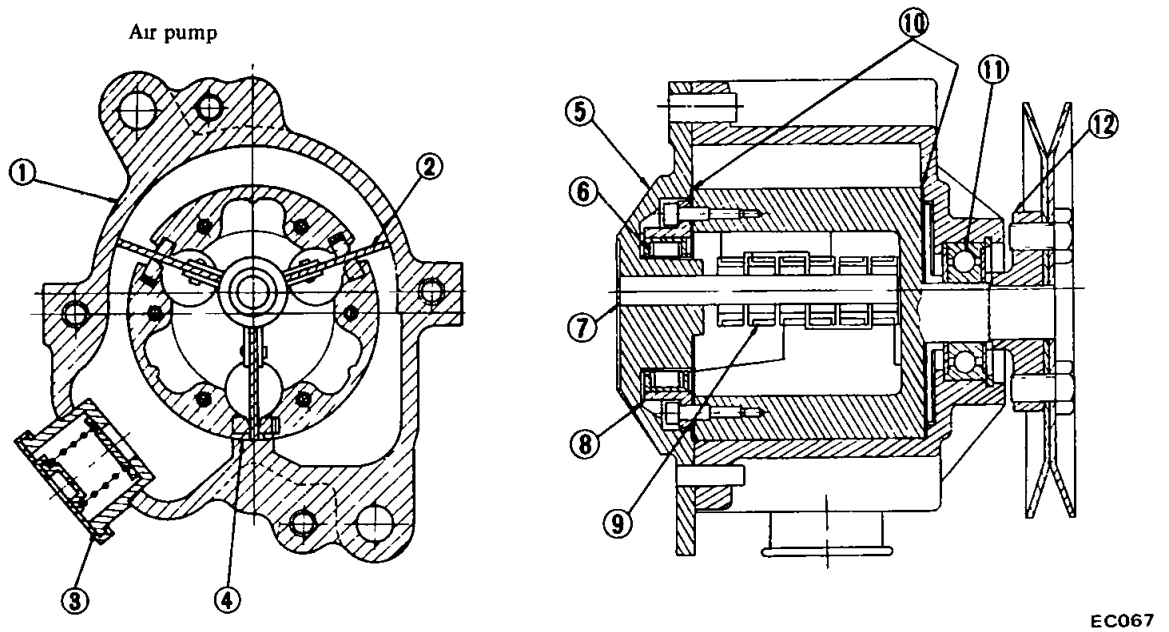
The die-cast aluminum air pump assembly attached to the front of the engine is driven by an air pump drive belt A rotor shaft, drive hub, relief valve and inlet and outlet tubes are visible on the pump exterior A rotor, vanes, carbon shoes, and shoe springs make up the rotating unit of the pump The rotor located in the center of the pump is belt-driven The vanes rotate freely around the off-center pivot pin, and follow the circular-shaped pump bore In the three-vane type, the vanes form three chambers in the housing Each vane completes a pumping cycle in every revolution of the rotor Air is drawn into the inlet cavity through a tube connected to the air cleaner Air is sealed between the vanes and moved into a smaller cavity (the compression area)

After compression, the vanes pass the outlet cavity The vanes subsequently pass the stripper, a section of the housing that separates the outlet and inlet cavities Continuing the cycle, the vanes again enter the inlet cavity to repeat its pumping cycle The relief valve, located in the outlet cavity, consists of a preloaded spring, seat, and pressure-setting plug Its function is to relieve the outlet air flow when the pressure exceeds a preset value

Carbon shoes support the vanes from slots in the rotor The shoes are designed to permit sliding of the vanes and to seal the rotor interior from the air cavities Leaf springs which are behind the follower-side of the shoes compensate for shoe wear and vane operating sound The rotor is further sealed by flexible carbon seals which are attached to each end The plates also seal off the housing and end cover to confine the air to the pump cavities

The rotor is a steel ring and bolted to the rotor end This ring prevents the rotor from spreading at high speed, and also positions and holds the rear bearing and the carbon seal.

The front and rear bearings which support the rotor are of two types The front bearing uses ball bearings and the rear bearing uses needle bearings The vane uses needle bearings All bearings have been greased



1 Housing
2 Vane
3 Relief valve
4 Stripper
5 End cover
6 Needle bearing
7 Vane shaft
8 Rotor ring
9 Needle bearing
10 Side seal
11 Ball bearing
12 Pulley hub

Fig EC-111 Sectional view of air pump (three valve type)

Air injection into each exhaust port

Fresh air from the air pump is injected into the individual exhaust ports of the cylinder head located near the exhaust valve

Pressurized air is transmitted through hoses and air distribution manifold

A schematic of the exhaust port is shown in Figure EC-112

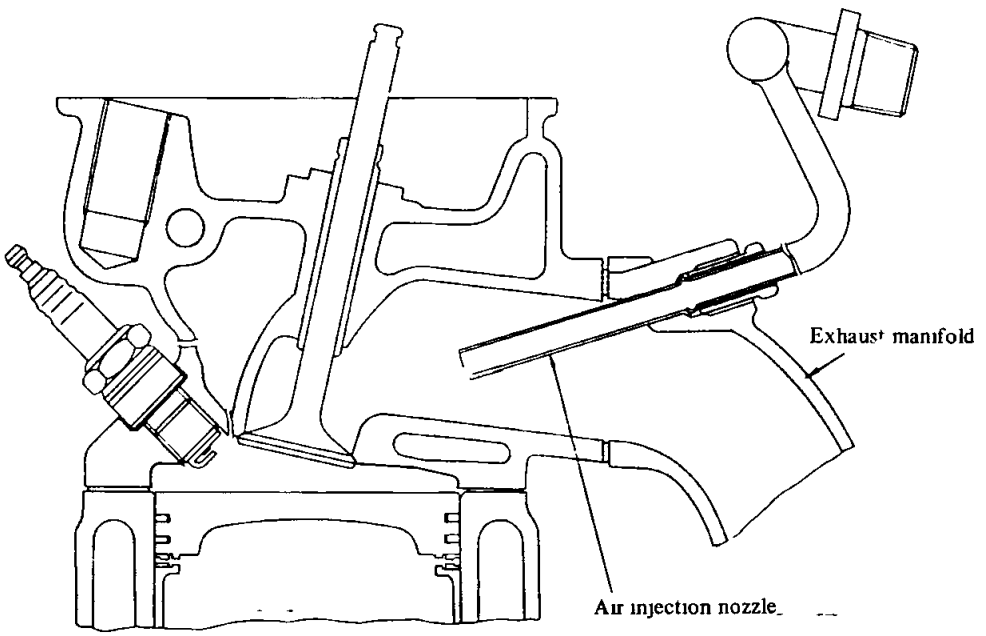


Fig EC-112 Air injection into exhaust port

In addition to the air injection system, certain controls have been incorporated to assure reliable system operation as follows

Anti-backfire valve

This valve is controlled by intake manifold vacuum and is used to prevent exhaust system backfire at the initial duration of deceleration At that time, the mixture in the intake manifold is too rich to burn and ignites when combined with injected air in the exhaust manifold

The anti-backfire valve is used to provide a supply of air into the intake manifold thereby making the air mixture leaner to prevent backfire

A schematic of the anti-backfire valve is shown in Figure EC-113

The anti-backfire valve inlet is connected to the air pump discharge line and outlet to the intake manifold

By burning this rapidly evaporated fuel within the cylinder, some contribution to emission reduction can also be expected

If the valve does not work properly, the fuel mixture will go through the combustion chambers without being ignited, meet fresh air and, at high temperature, backfiring will result

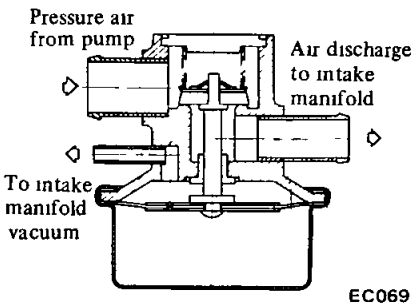


Fig EC-113 Anti-backfire valve

Check valve

A check valve is located in the air pump discharge lines The valve prevents the backflow of exhaust gas Backflow of exhaust gas occurs in one of the following cases

1 When the air pump drive belt fails

2 When the spring of relief valve fails

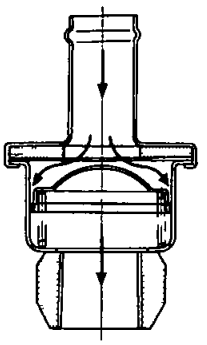


Fig EC-114 Check valve

Air pump relief valve

The air pump relief valve is mounted in the discharge cavity of the air pump and accomplishes the following functions without affecting effectiveness of the exhaust emission control system

1 Minimizes exhaust gas temperature rise

2 Minimizes horsepower losses resulting from air injection into the exhaust system

3 Protects the pump from excessive back pressure

REMOVAL, DISASSEMBLY AND INSPECTION

Primarily, do not remove the exhaust emission control system

When the removal is unavoidable, however, thoroughly inspect before removing

Air pump

Removal

1 Disconnect the hoses from the air pump housing cover

2 Remove the bolt securing the air pump to the belt adjusting bar (or adjusting bracket)

3 Remove the bolt securing the air pump to the mounting bracket and remove the air pump drive belt

4 Dismount the air pump assembly from the vehicle

Periodical service

No periodic maintenance is required since the bearings in the pump are lubrication free types Every 3,000 miles, however, the belt tension should be inspected and adjusted

Disassembly

1 Remove four pulley drive bolts and remove the pulley from the hub

2 Secure the air pump drive hub in a vise, as shown in Figure EC-115 and remove four end cover bolts

Note Never clamp on the aluminum housing

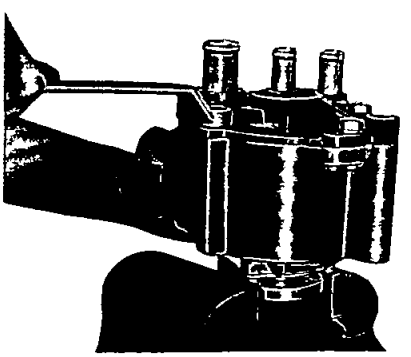


Fig EC-115 Removing cover

3 Remove the end cover by carefully tapping the surrounding of the large dowel pin with a plastic mallet and lifting up straight

4 Put match marks "O" on the rotor ring and side of rotor to ensure correct reassembly, and remove six screws that retain the rotor ring to the rotor, using a hexagonal wrench (special tool ST19810000)

Note Generally, match marks are indicated on both rotor ring and rotor by the manufacturer

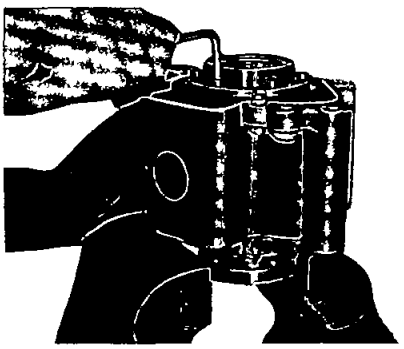


Fig EC-116 Removing rotor ring

5 Remove the rotor ring and side carbon seal from the rotor

6 In the three-vane type, if it is necessary to replace the rear bearing, it may be pressed out of rotor ring on a press using a support for disassembling rotor ring and attachment for pushing out needle bearing

Special tool

Support for diassembling rotor ring
STECP ST19820000

Attachment for pushing out needle bearing
STECP ST19830000

Note Support rotor ring carefully to avoid distortion

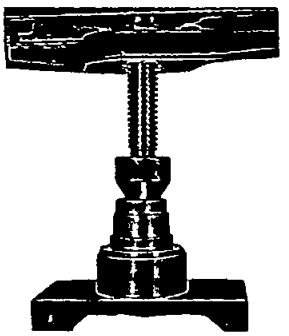


Fig EC-117 Removing rear rotor bearing

7 Remove vanes from the rotor

8 Remove three sets of carbon shoes and three shoe springs (two sets of carbon shoes and two shoe springs for the two-vane type) using a pair of tweezers or needle nose pliers

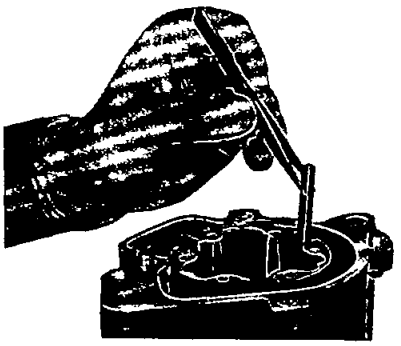


Fig EC-118 Removing carbon shoe

9 In the three-vane type air pump, if it is necessary to replace the relief valve, use bridge for pulling out relief valve (special tool ST19850000) and standard puller

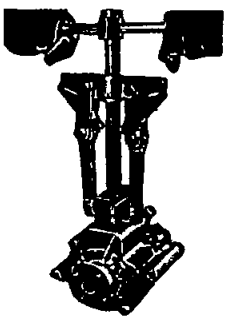


Fig EC-119 Removing relief valve air pump

10 No further disassembly should be attempted

Cleaning-inspection-lubrication

Cleaning

Clean the rear bearing and vane hub with bearings solvent Remove carbon dust from pump housing and rotor assembly with compressed air

Note Do not use cleaning solvent on pump inner housing and rotor assembly

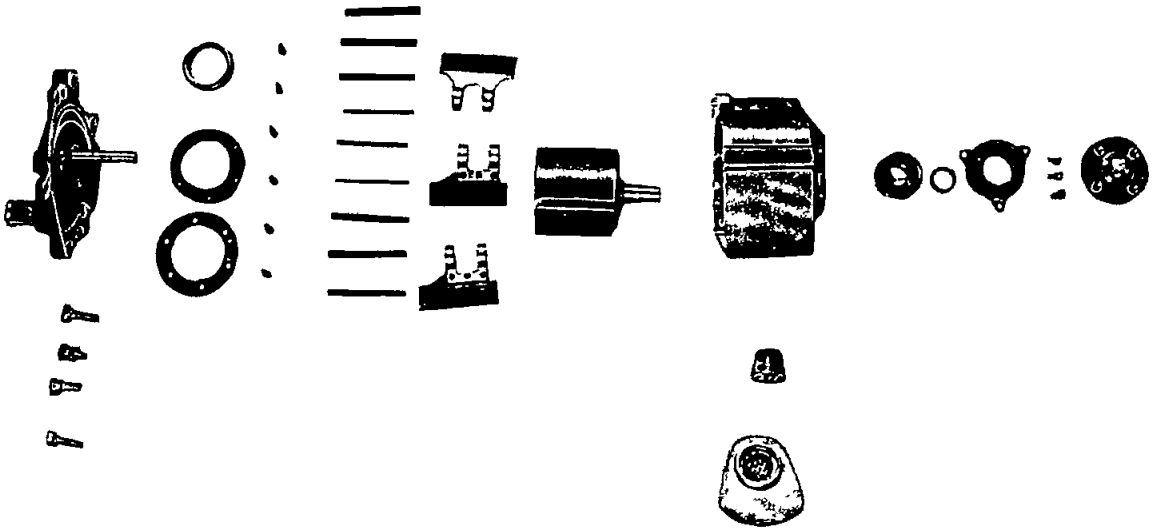


Fig EC-120 Components of three-valve type air pump

Inspection

Inspect all parts for chipping, scoring, wear or roughness

All damaged parts must be replaced to ensure quiet and efficient operation

If especially side carbon seal is scored, replace with a new one (for the three-vane type)

Carbon dust may be present in the housing and is usually an indication of normal wear

Lubrication

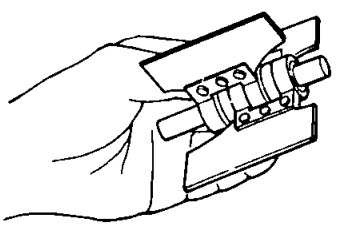
The rear bearing and vane hub bearings must be lubricated with a high melting point grease such as ESSO ANDOK 260 or equivalent Grease each bearing to insure adequate lubrication

Note Bearings for service are already packed with high melting point grease

Assembly of air pump

1 Place the air pump housing in a vise, clamping the pump drive hub between jaws

2 Assemble vanes correctly on dummy shaft of 0 3740 inch diameter (special tool ST19860000)



EC074

Fig EC-121 Vane assembly

3 Place vanes into rotor With the three-vane type make sure that one vane is against housing stripper, and do not remove the dummy shaft at this time

Notes

a Pack the vane hub bearing with high melting point grease such as ESSO ANDOK 260

b The vanes may require five to ten miles wear-in running time In the event a slight squeaking still persists, drive the vehicle about 40 to 50 mph In most cases five to ten miles will be sufficient for wear-in

4 Insert one carbon shoe on each side of every vane

Note Each carbon shoe must be positioned so that chamfered end of shoe faces to vane

5 Insert the shoe spring into each deeper shoe slot

Note When springs are properly positioned, the curved portion of spring will be against the shoe and

the opposite side will be against wall of shoe slot

6 In the three-vane type, if rear bearing was removed, a new bearing may be pressed into rotor ring using attachment for pressing in needle bearing (special tool ST19840000) The bearing should be about 0 0315 inch below rotor ring surface

Note Press only on lettered end of the bearing surface and support rotor ring to prevent its distortion.

7 Position new side seal on rotor ring so that holes line up
8 Position the rotor ring so that the marks "O" on rotor ring and side of rotor line up
9 Apply thread locking material to rotor ring retaining screws and tighten them to 2 2 to 3 6 ft-lb
10 Remove the dummy shaft from vanes and insert vane shaft into vane bearings Do not force cover on since it will distort vane bearings and/or vane bearing alignment
11 Install the end cover First, set the position of the end cover by temporarily tightening bolts adjacent to the dowels, and then retighten all the four bolts

Reinstalling the air pump

Reinstall the air pump in reverse sequence of removal

Adjust the belt tension so that it has about 0 5 inch of slack under thumb pressure

Reinstall the air pump is reverse sequence of removel, noting the following points

Adjust the belt tension so that it has about 0 5 inch of slack under thumb pressure

Drive pulley

1 Loosen the air supply pump adjusting bar nut and bolt to relieve the belt tension
2 Remove the drive pulley attaching bolts

Anti-backfire valve

When removing the anti-backfire valve, disconnect the hoses No further disassembly should be done After installation, check the valve operation and inspect all hoses and hose connections for leaks

Check valve

1 Disconnect the air supply hose
2 Remove the check valve from the air gallery pipe holding the flange of air gallery pipe with a wrench

Note
a Be careful not to damage the air gallery pipe
b No further disassembly should be done

3 Reinstall the check valve in reverse sequence of removal

Note Tightening torque is 65 to 76 ft-lb

4 After installation, check the valve, hoses and hose connections for air leakage

Air gallery pipe and injection nozzles

It is very difficult to remove the air gallery from the exhaust manifold without bending the pipe, which could result in fractures or leakage Therefore, the removal of the air gallery pipe and injection nozzles should be done only when they are damaged

1 Lubricate around the connecting portion of the air injection nozzle and air gallery with engine oil
2 Hold the air injection nozzle hexagon head with a wrench and unfasten the flare screw connecting the air gallery to injection nozzle Remove the air gallery

Note
a Apply engine oil to the screws several times during the above work
b. Be careful not to damage other parts

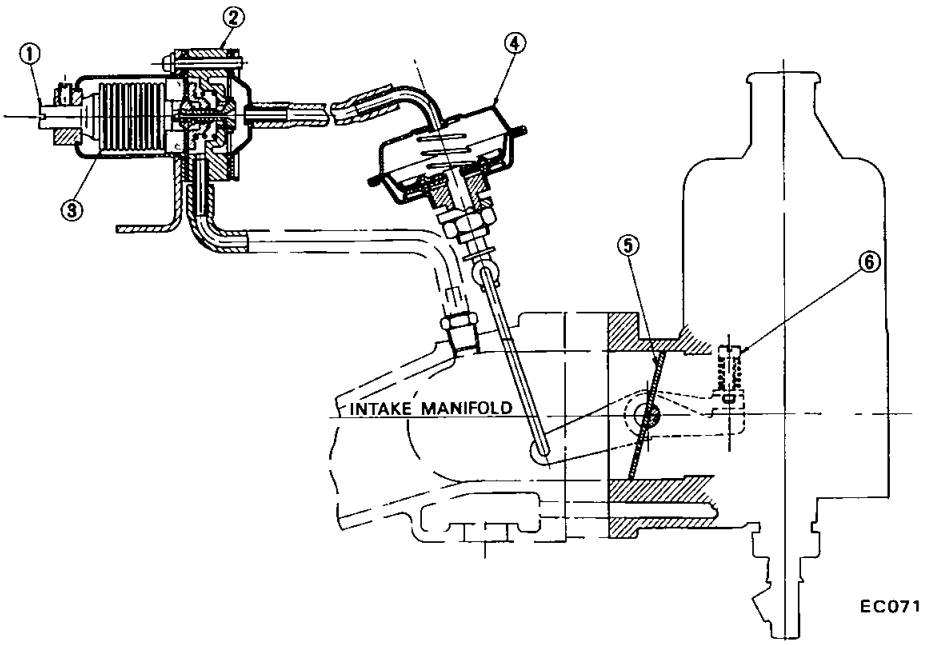
3 Unfasten the air injection nozzle from the cylinder head applying the engine oil to the screwed portion several times
4 Check the air gallery and nozzle for fractures or leakage Clean the air injection nozzle with a wire brush
5 At the time of installation, assemble the nozzle seat on the injection nozzle and tighten the air injection nozzle to a torque of 41 to 55 0 ft-lb
6 Hold the air injection nozzle hexagon head with a wrench and tighten the flange screw of the air gallery to a torque of 36 to 43 ft-lb
7 Check the cylinder head, air injection nozzle and air gallery for leaks with the engine running

ENGINE MODIFICATIONS

Throttle opener

This engine modification system consists of a vacuum control valve which detects negative pressure of the intake manifold and operates the servo diaphragm which controls carburetor throttle valve in response to the vacuum control valve operation This engine modification system has been designed so that HC emission is reduced when engine brake is applied

The control valve self-contains an altitude compensating device so that the control valve also operates correctly at a high land (where the air is rare) and characteristics of this control valve allow the control valve changing its operating negative pressure in approximate proportion to the atmospheric pressure (Refer to Figure EC-122)



1 Vacuum adjusting screw
2 Vacuum control valve
3 Altitude corrector
4 Servo diaphragm
5 Carburetor throttle plate
6 Opener adjusting screw

Fig EC-122 Engine modification system

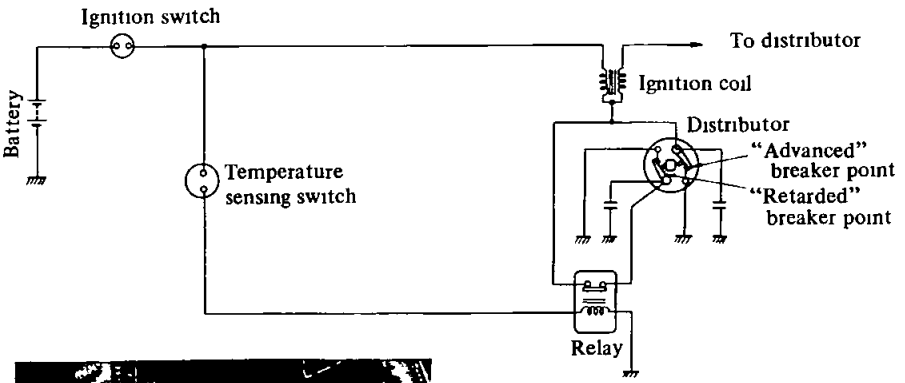
Dual point distributor for automatic transmission

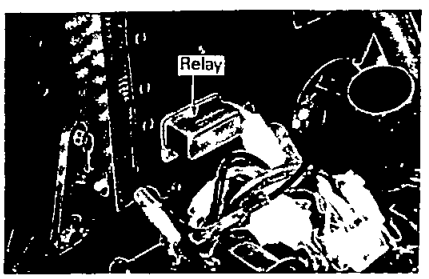
The automatic transmission vehicle produces more exhaust gas in volume than the manual transmission vehicle does For this reason, the former vehicle is compelled to provide a means of decreasing the concentration of exhaust pollutants It follows from the above consideration that the automatic transmission vehicle should have more "retarded" spark timing than the manual transmission vehicle should It should also have normal "advanced" spark timing to assure driveability at low ambient temperatures

To satisfy these two requirements, the 1971 and later model L24 engines employ a dual point distributor similar in design and construction to that introduced in the L16 engine

The dual point distributor provides two spark timings, "advanced" and "retarded" The system consists of a 2-point distributor, a relay and a temperature sensing switch Difference in these two timings is 10 degrees of crankshaft rotation The "advanced" timing is used to give earlier timing in the cycle for optimum engine performance at low temperature The "retarded" position is used in the usual application and helps reduce the emission of harmful pollutants to a minimum The following table shows outside temperatures and the application of the two spark timings

Ignition Timing	Temperature	Switch
"Retarded"	above 52°F	OFF
"Advanced"	below 30°F	ON





Relay

Fig EC-123 Schematic drawing of control system for L24 engine with automatic transmission

Note Operation of the switch is affected by hysteresis of the bi-metal It opens at 52°F when temperature is raised from low to high It closes at 34°F when temperature is lowered from high to low Allowable variation of this switch is within ±5 degrees If the switch is turned off at 57°, it indicates that the switch is still serviceable

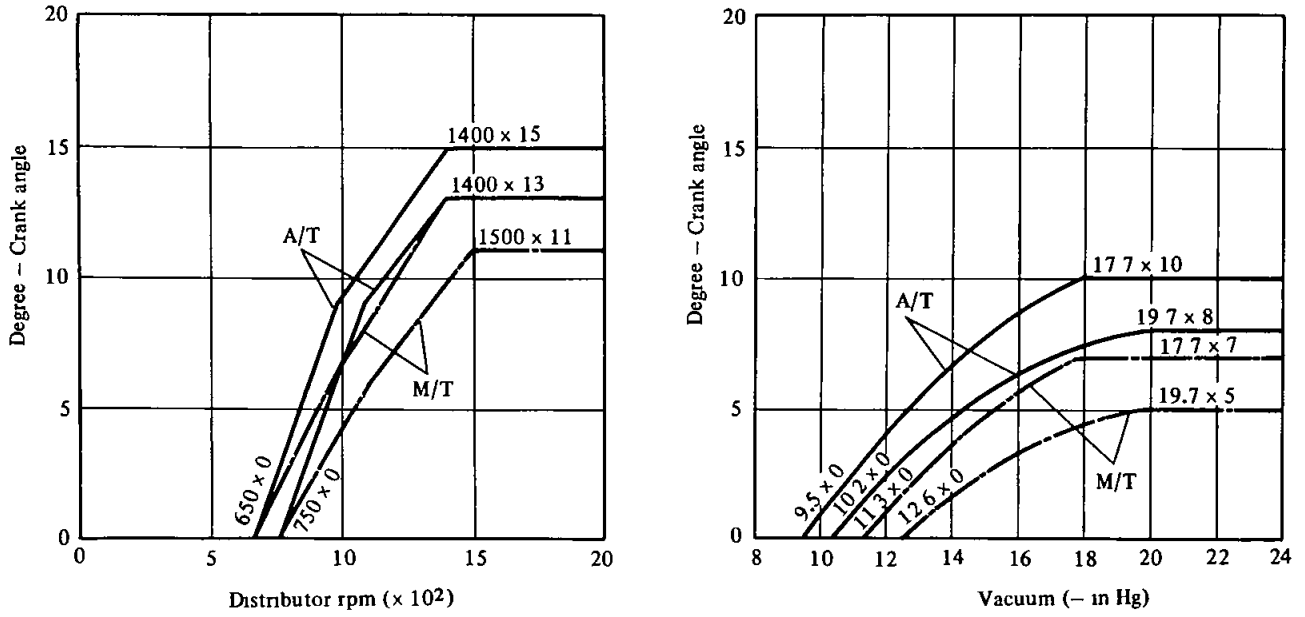


Fig EC-124 Distributor advanced charatarıstics

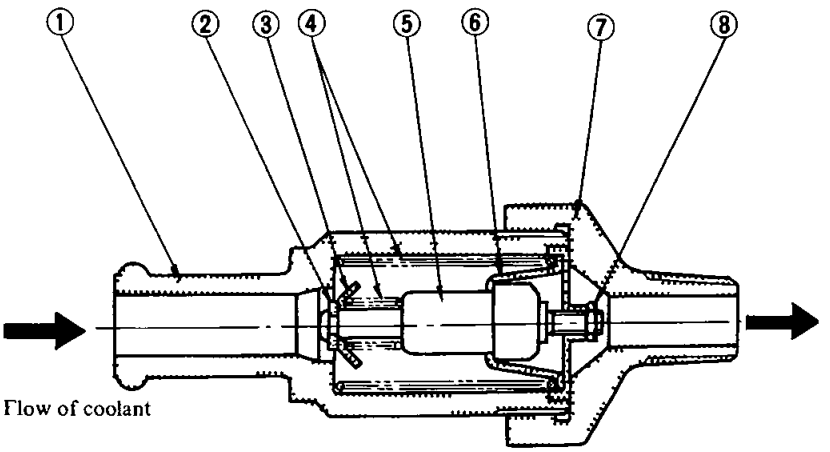
Manifold heat control thermostat

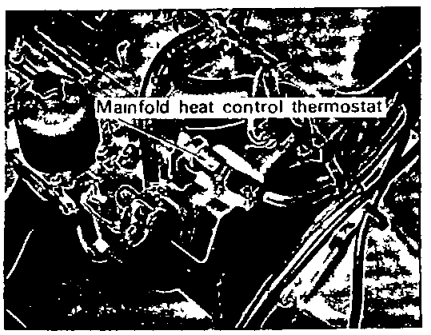
Manifold thermostat is installed on the 1972 models

This device operates in the following manner, that is, the engine is quickly warmed-up and then the coolant in the intake manifold and carburetor is kept in constant temperature at various vehicle speeds

This thermostat is shut down when coolant temperature is above 150°F

Then the flow of coolant is stopped in the intake manifold line





1 Case
2 E ring
3 Valve
4 Spring
5 Pellet
6 Supporting case
7 Adjusting nut
8 Case cover

Fig EC-125 Manifold heat control thermostat

Hot-air type air cleaner

The vehicle has a hot-air type air cleaner with a manual hot-air valving at the inlet port of the cleaner The valve is set in the "winter" position when the ambient temperature is very low This closes the inlet port and admits hot air around the exhaust manifold, thereby facilitating cold starting in cold weather Outside air enters the cleaner when the valve is set in the "summer" position

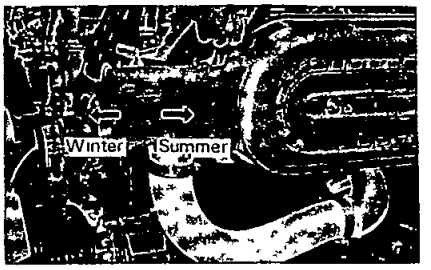
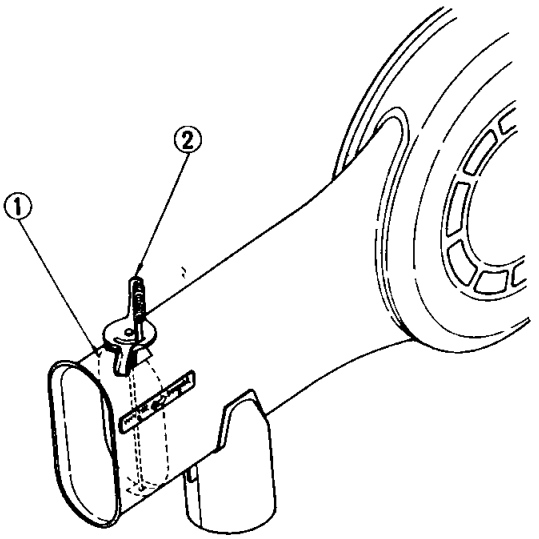


Fig EC-127 Switching for "winter" and "summer" starting



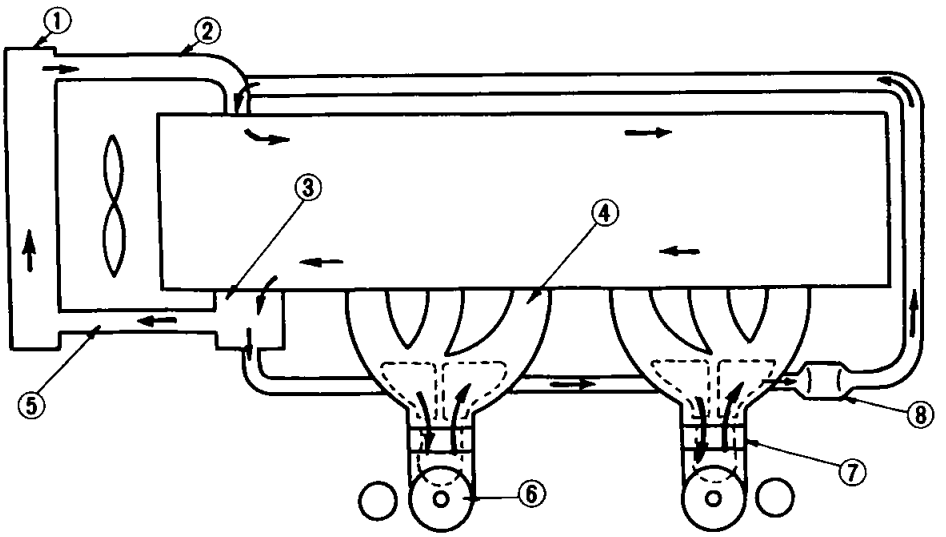
1 Air control valve
2 Valve lever

Fig EC-126 Hot-air type air cleaner

Temperature control of SU-type carburetor by engine coolant

On the SU-type carburetor, the flow rate of fuel varies with a change in the temperature of gasoline which is largely affected by viscosity variations The carburetor is heated by engine coolant This design not only keeps a nearly constant flow rate regardless of ambient temperature variations, but also contributes much to improved atomization into the air intake system

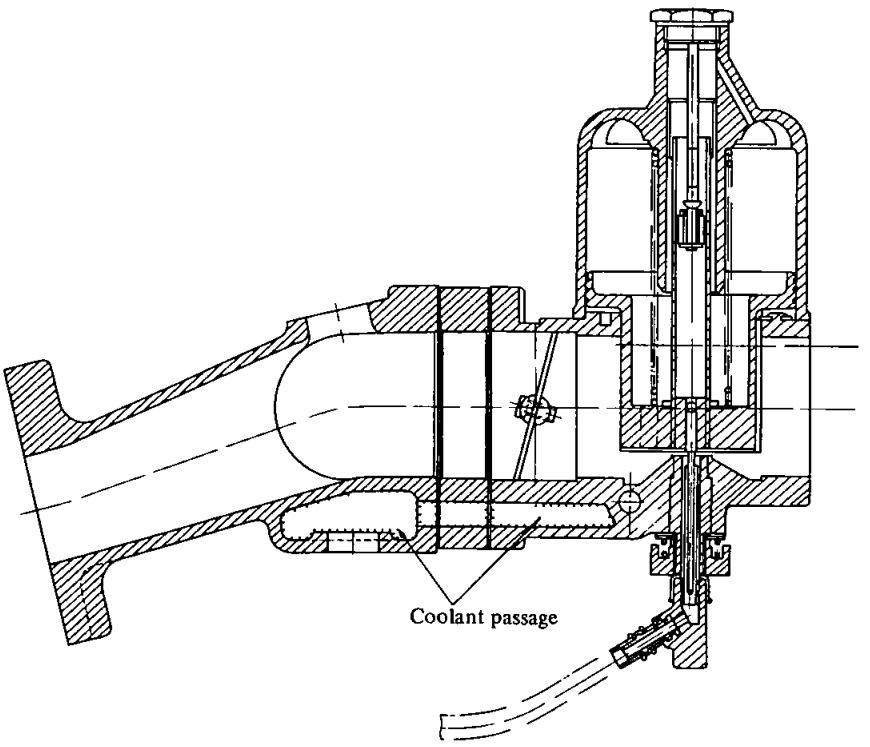
A small-sized thermostat was employed to control the flow of coolant to prevent deterioration under hot weather



1 Radiator
2 Water inlet
3 T/housing
4 Intake manifold
5 Water outlet
6 Carburetor
7 Carburetor insulator
8 Manifold heat control thermostat

EC072

Fig EC-128 (a) Coolant passage



EC073

Fig EC-128 (b) Coolant passage

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION EC-64
FLOW GUIDE VALVE EC-65

DESCRIPTION

This system is composed of the following four basic elements

1 Fuel tank with positive sealing filler cap
2 Vapor-liquid separator
3 Vapor vent line
4 Flow guide valve

When the engine is at rest, the vapor vent line, vapor liquid separator and fuel tank are filled with evaporation gas produced in the closed type fuel tank A flow guide valve opens when the gas pressure exceeds 0 4 inch Hg The gas passed through the flow guide valve - (2) is stored into the crankcase Once the engine starts operation, evaporation gas in crankcase, manifold and carburetor air cleaner are sucked into the manifold for combustion When the pressure of the closed type fuel tank, vapor liquid separator and vapor vent line becomes negative by decreasing the fuel, the flow guide valve (1) opens to send fresh air from the carburetor air cleaner to the fuel tank

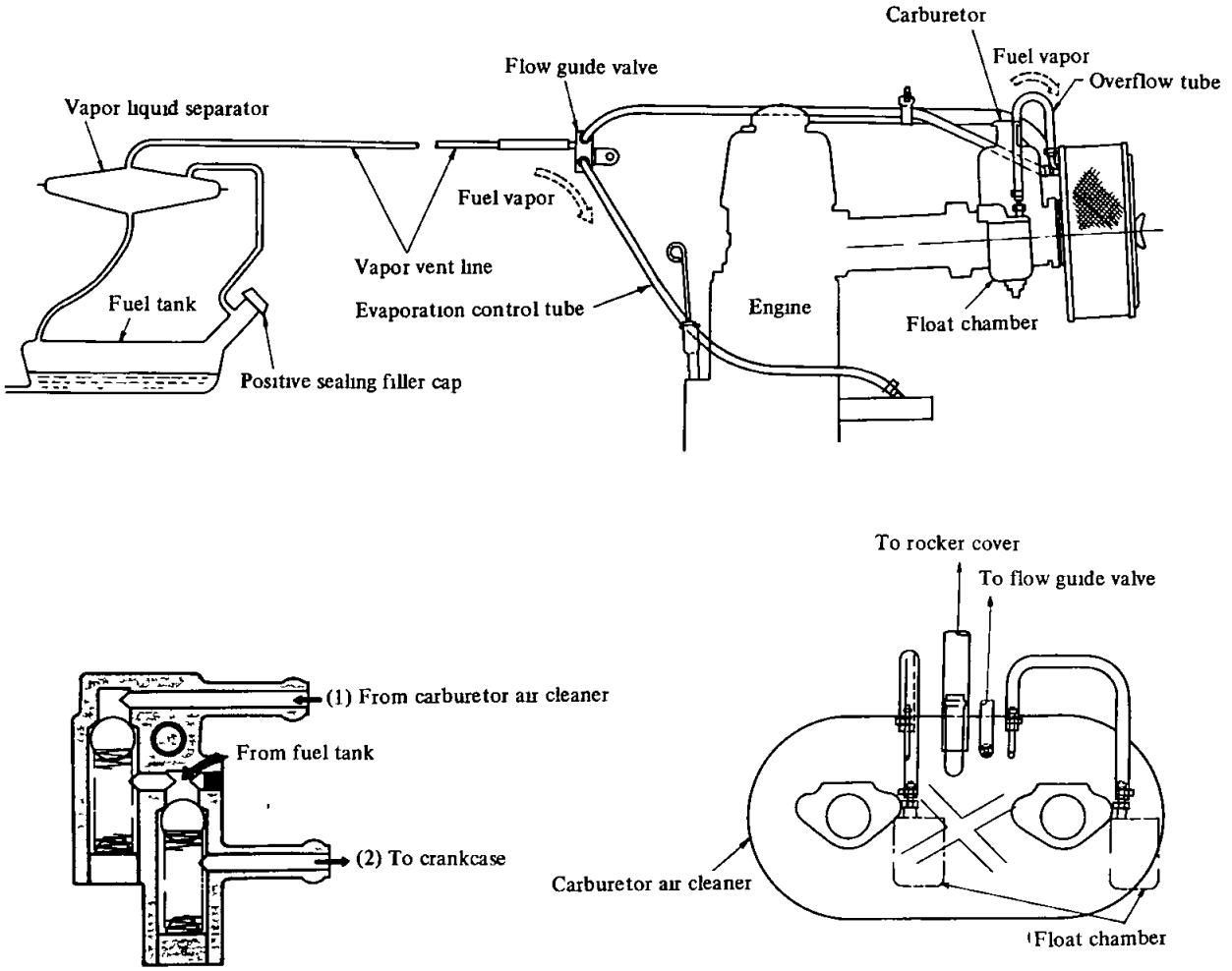


Fig EC-129 Evaporative emission control system

FLOW GUIDE VALVE

This valve operates to prevent reverse flow of blow-by gas from the crankcase This valve is mounted inside the engine compartment The letters, A, F and C are engraved in the body of the valve, indicate the connection of the vapor vent line

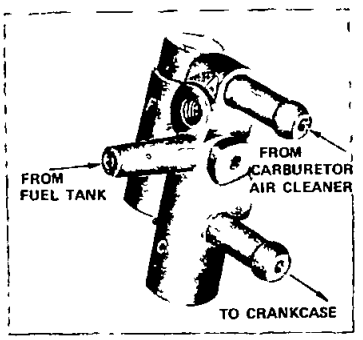


Fig EC-130 Flow guide valve

MAINTENANCE AND TESTING

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Spark plug	EC-66
High tension cable	EC-66
Battery	EC-66
Air cleaner element	EC-67
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GENERAL MAINTENANCE

To make sure that exhaust emissions are maintained at a low level, it is recommended that inspection be conducted every 12 months or every 12,000 miles, whichever occurs first Best engine operation and minimum exhaust emissions will be obtained through periodical inspections and from recommended servicing at these intervals

Carburetor

Check the choke setting and adjust to the specifications as required

Proper carburetor idle mixture adjustment is imperative for best exhaust emission control

Refer to the article given in "Setting ignition timing and adjusting idle speed and mixture"

Distributor

Check the distributor breaker points for abnormal pitting and wear Replace if necessary Make sure they are in correct alignment for full contact and that point dwell and gap are correct Clean and apply distributor grease to the cam and wick. Breaker points should be replaced at intervals not exceeding 12,000 miles

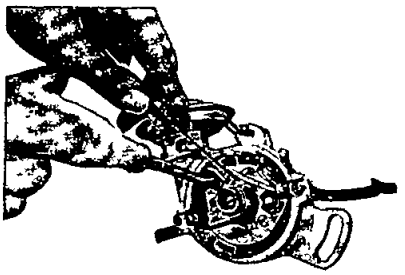


Fig EC-131 Checking of distributor breaker point gap

Spark plug

Remove and clean plugs in a sand blast cleaner. Inspect each spark plug Make sure that they are of the specified heat range Inspect insulator for cranks and chips Check both center and ground electrodes If they are excessively worn, replace with new spark plugs File center electrode flat Set the gap to 0 0315 to 0.0355 inch by the use of a proper adjusting tool Spark plug should be replaced every 12,000 miles.

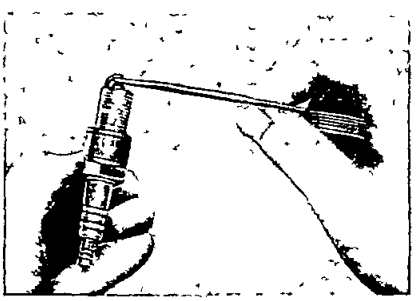


Fig EC-132 Checking of spark plug point gap

High tension cable

Use an ohmmeter to check resistance on secondary cables Disconnect cables from spark plugs and remove distributor cap from distributor together with the secondary cables Do not remove cables from the cap Connect the ohmmeter between the cable terminal on the spark plug side and the corresponding electrode inside the cap

If the resistance is more than 30,000 ohms, remove the cable from the cap and check the cable resistance only If the resistance is still more than 30,000 ohms, replace the cable assembly

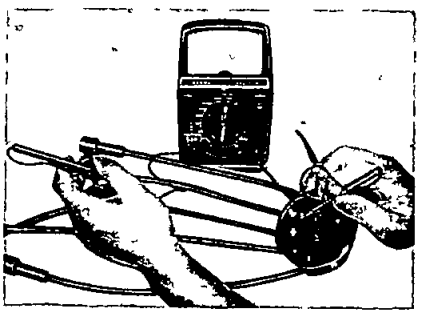


Fig EC-133 Checking of high tension cables

Battery

Measure specific gravity of electrolyte with an accurate hydrometer Specific gravity should be 1 220 or more at the standard Add mineral free water (distilled water) as required to

bring electrolyte up to proper level

Clean battery posts and cable terminals After tightening clamps, coat the battery posts and clamps slightly with grease to retard corrosion

Air cleaner element

The paper element has been specially treated, and therefore, there is no need to clean it But it should be replaced every 24,000 miles

CRANKCASE EMISSION CONTROL SYSTEM

1 Check hoses and hose connections for leaks

2 Disconnect all hoses and blow them out with compressed air

If any hose can not be cleared of obstructions, replace with a new one

3 Testing of the crankcase ventilation control valve

With engine running at idle, remove the ventilator hose from the crankcase ventilation control valve If the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over the valve inlet If valve is clogged, do not attempt to clean it Replace with a new valve Check for deposit clogging in the hose Clean if necessary

AIR INJECTION SYSTEM

The following procedures are recommended for checking and/or verifying that the various components of the exhaust emission control system are operating properly

The engine and all components must be at normal operating temperatures when the tests are performed Prior to performing any extensive diagnosis of the exhaust control system, it must be determined that the engine as a unit is functioning properly (Disconnect the anti-backfire valve vacuum sensing hose and air supply hose at the intake manifold connections Plug the manifold connector to preclude leakage Plug the anti-backfire valve vacuum sensing hose to close the passage to the intake manifold A I S) After checking the normal engine operation, reinstall all the A I S parts

Testing of check valve

This test can be performed at the same time as the air pump test

1 Operate the engine until it reaches normal operating temperature

2 Inspect all hoses and hose connectors for obvious leaks and correct, if necessary, before checking the valve operation

3 Visually inspect the position of the valve plate inside the valve body It should be lightly positioned against the valve seat away from the air distributor manifold

4 Insert a probe into the valve connection on the check valve and depress the valve plate It should freely return to the original position, against the valve seat, when released

5 Leave the hose disconnected and start the engine Slowly increase the engine speed to 1,500 rpm and watch for exhaust gas leakage at the check valve There should not be any exhaust leakage The valve may flutter or vibrate at idle speed, but this is normal due to exhaust pulsations in the manifold

6 If the check valve does not meet the recommended conditions, replace it

Testing of anti-backfire valve

1 Operate the engine until it reaches normal operating temperature.

2 Inspect all hoses and hose connections for obvious leaks, and correct, if necessary, before checking the anti-backfire valve operation

3 Disconnect the air hose from intake manifold at the anti-backfire valve Insert a suitable plug in the hose and fasten it securely

4 Open and close the throttle valve rapidly, if air flow is felt for one to two seconds by a finger at anti-backfire valve outlet to the intake manifold, the valve is functioning properly

If air flow is not felt or air flow is felt continuously more than two seconds, the valve should be replaced

5 Connect the air hose to intake manifold and disconnect the air inlet hose from the air pump at the anti-backfire valve If engine idle speed changes excessively, the valve function is not correct and it should be replaced

Note In case of idle racing anti-backfire valve cannot be considered abnormal even if there exists afterburning, since it never comes out while running

Testing of air pump

1 Operate the enigne until it reaches normal operating temperature

2. Inspect all hose, hose connections, air gallery for leaks and correct, if necessary, before checking the air injection pump

3 Check the air injection pump belt tension and adjust to specifications if necessary

4 Disconnect the air supply hose at the check valve

5 Insert the open pipe end of the air pump test gauge adapter (special tool ST19870000) in the air supply hose Clamp the hose securely to the adapter to prevent it from blowing out Position the adapter and test gauge so that the air blast emitted through the drilled pipe plug will be harmlessly dissipated

6 Install a tachometer on the engine With engine speed at 1,500 rpm observe the pressure produced at the test gauge

Air pressure should be 0.63 inch Hg or more

7 If the air pressure does not meet the above pressures, proceed as follows

(1) Repeat 2 and 3 above
(2) Disconnect the air supply hose at the anti-backfire valve Plug the air hose opening, and screw with a clamp Repeat the pressure test
(3) Check the filter element
(4) With engine speed at 1,500 rpm close the hole of the test gauge by finger If a leaking sound is heard or leaking air is felt by finger at the relief valve, the relief valve is malfunctioning The relief valve should be replaced or repaired
(5) If the air injection pump does not meet the minimum requirement of the pressure test, it should be replaced

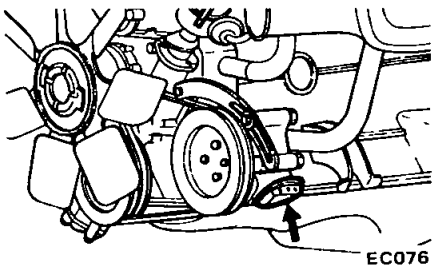


Fig EC-134 Testing of relief valve

ENGINE MODIFICATIONS

Functional inspection of throttle opener (at first 600 miles and every 12,000 miles)

The control valve operating negative pressure is precisely adjusted when shipped from the plant, and therefore, no complicated adjustment is required normally

Normally, it will be sufficient to conduct the following inspections

After completing the adjustment of idling speed, with the engine which is performing air injection,

1 Increase the engine speed once up to 2,000 rpm without applying load, and release the accelerator linkage from holding with hand quickly
2 The servo diaphragm operates once at the full stroke 0 1969 inch, the stroke returns gradually as the speed lowers, and when the speed returns to the idling speed, the operation will be released completely
3 It is normal that time required in lowering speed from 2,000 rpm to 1,000 rpm ("T" in Figure EC-136) is approximately three seconds

In the event of the following cases, adjustment or replacement of parts concerned is required

First, perform adjustment in accordance with the instructions for periodical inspection and adjustment

4. In the case that the servo diaphragm operates continuously and speed does not lower, or time required in lowering speed from 2,000 rpm to 1,000 rpm is too long (six seconds or longer) and speed does not return to the idling speed timely

Cause Control valve operating negative pressure is too low (low boost).

5. In the case that the servo diaphragm does not operate, or the servo diaphragm operates but does not fully stroke

Cause Control valve operating negative pressure is too high (high boost).

Altitude adjusting of thottle opener (at every 12,000miles)

Control valve operating negative pressure changes in response to altitude as described previously Hence, operating negative pressure to be adjusted should change in response to the altitude (the atmospheric pressure) of the place where the vehicle is driven Figure EC-135 indicates relationship between operating pressure to be adjusted and altitude (atmospheric pressure)

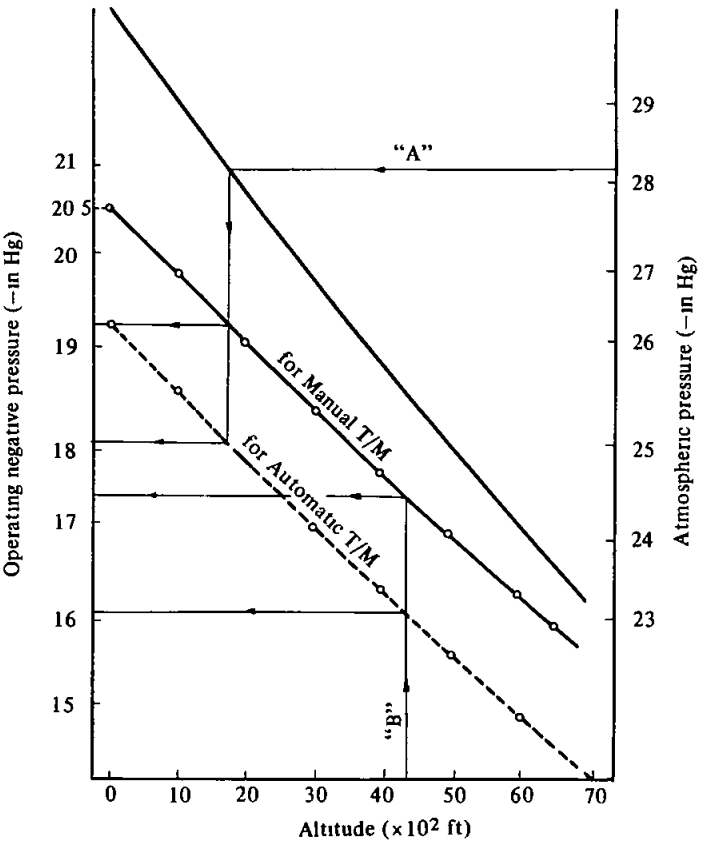


Fig EC-135 Operating negative pressure of control valve

How to read the Figure EC-135

- o When the atmospheric pressure of the place where the vehicle is driven is known, read the operating negative pressure by following arrow mark "A"
- o When the atmospheric pressure is unknown, read operating negative pressure by following arrow mark "B" from the altitude of that place

When operating negative pressure to be adjusted is known, conduct inspection and adjustment in accordance with the following instructions

(With the engine for which idling speed adjustment has been completed and which is performing air injection)

1 Connect a vacuum gauge to the connector-AB valve

2 Raise the speed once up to 2,000 rpm without applying load, and release the accelerator linkage from holding by hand quickly

3. Make sure that the manifold vacuum rises, control valve operates, the manifold vacuum is transferred to the servo diaphragm, and that the servo diaphragm operates once at the full stroke 0 1969 inch

4. Thereafter, both speed and manifold vacuum decrease, or when one to two seconds are elapsed, both of them stop lowering Figure EC-136 shows these phenomena

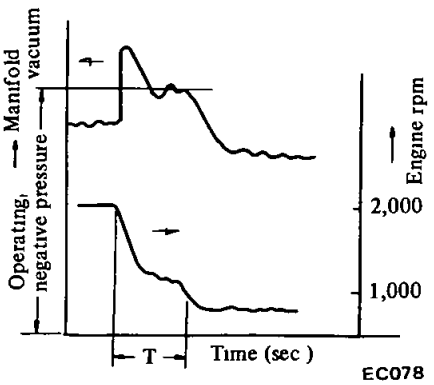


Fig EC-136

5 Manifold vacuum at that time is called "Operating negative pressure"

Loosen the lock screw (2) and adjust the vacuum adjusting screw (1) correctly so that the operating negative pressure meets the value obtained from the Figure EC-135

When the above described phenomena cannot be identified, drive the vehicle actually and perform coasting The phenomena will be verified more practically

When actually driven and such phenomena still cannot be identified, the operating negative pressure of the control valve is damaged, or servo diaphragm is erroneously adjusted or damaged

6 Upon completion of the above described adjustments, confirm the operation through conducting the routing inspection, and make sure that time required in lowering speed from 2,000 rpm to 1,000 rpm without applying load is less than 6 seconds

Testing of spark advance control system

1 Disconnect the lead wires from the terminal of the distributor, and connect the ammeter between the lead wire for the retarded breaker point and ground

2 Set the ignition key in the "ON" position (Do not start the engine)

3. Make sure that the temperature sensing switch is "ON" and the room temperature is above 52°F Then make sure that the ammeter indicates about 3 amperes

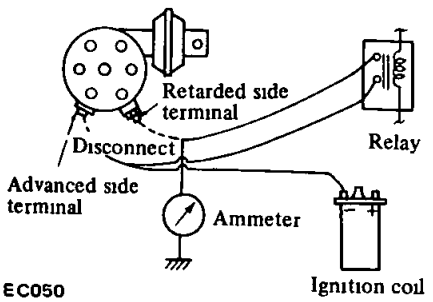


Fig EC-137 Testing of spark advance control system

In case the ammeter indicates zero in step 1

1. Check whether or not relay terminals are loose

2 If they are in correct conditions, disconnect terminals of relay and measure the voltage between terminal and "ground." (See Figure EC-138)

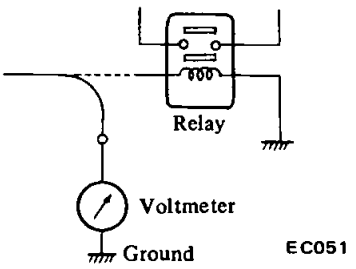


Fig EC-138 Measurement of voltage

3 In case the voltage is zero, something must be wrong with the relay, which must be replaced

4 In case the voltage is approximately 12V, something must be wrong with temperature sensing switch, which must be replaced

Inspection of manifold heat control thermostat

Troubles

Defects in manifold heat control thermostat can cause improper engine operation such as

Kept closed

The temperature of carburetor and intake manifold do not rise, which in cold weather may cause hesitation and backfire

Kept open

In hot weather, percolation may occur in the carburetor, causing unstable idling and hesitation at acceleration.

Checking of operation

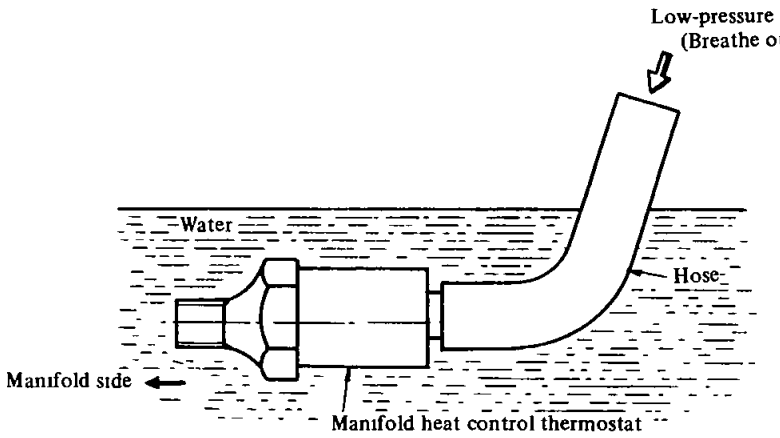


Fig EC-139 Check of manifold heat control thermostat

1. Immerse the thermostat in hot water of 175°F, or above for a few minutes and blow in low-pressure air (1 5 to 3 psi) from the side adverse to the manifold

Little or no bubbles from the manifold side indicates normality

2 When immersed in cold water, it is normal that the air passes through the thermostat easily

If operation is improper, replace with a new thermostat assembly

Temperature control by engine coolant

1 Before removing the carburetor, carburetor insulator, or intake manifold for one reason or another, be sure to drain coolant of approximately ½ U S gal in the radiator

Caution Failure to follow this rule may cause coolant to creep into the cylinders Should this occur, immediately remove the spark plugs and run the starting motor until the coolant is thoroughly removed from the cylinders

2 The thermostat is factory adjusted to the pre-determined temperatures Do not remove it from its housing unless absolutely necessary

EVAPORATIVE EMISSION CONTROL SYSTEM

Checking of fuel tank, vapor-liquid separator and vapor vent line

1 Check all hoses and fuel tank filler cap

2 Disconnect the vapor vent line connecting flow guide valve to vapor-liquid separator

3 Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way change cock) to the end of the vent line

4 Supply fresh air into the vapor vent line through the cock little by little until the pressure becomes 14.5 inch Aq

5 Shut the cock completely and leave it that way

6 After 2 5 minutes, meausre the height of the liquid in the manometer

7 Variation of height should remain within 1 0 inch Aq

8. When the filler cap does not close completely the height should drop to zero in a short time

9 When the filler cap is removed, and the height does not drop to zero in a short time, it is the cause of the stuffy hose

Note When the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock It must therefore be repaired or replaced

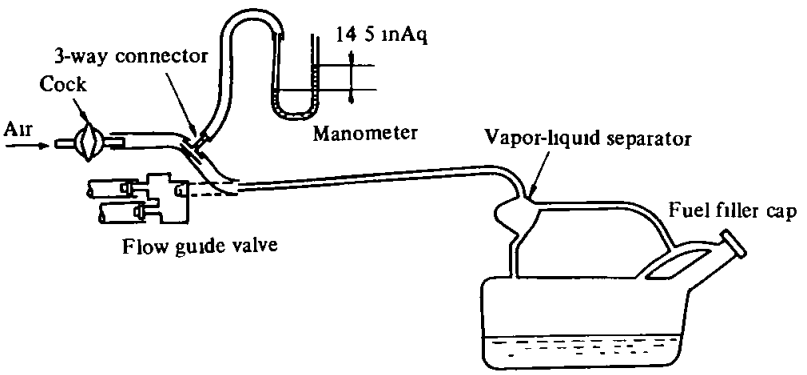


Fig EC-140 Checking of evaporative emission control system

Checking of flow guide valve

1 Disconnect all hoses from the flow guide valve
2 While lower pressure air is pressed into the flow guide valve from the ends of vent line of fuel tank side, air should go through the valve and flow to crankcase side If air does not flow, the valve should be replaced But when air is blown from crankcase side, it should never flow to other two vent lines
3 While air is pressed into the flow guide valve from carburetor air cleaner side, it flows to the fuel tank side and/or crankcase side
4 This opens when the inner pressure is 0 4 inch Hg When operation is improper or breakage exists, replace it

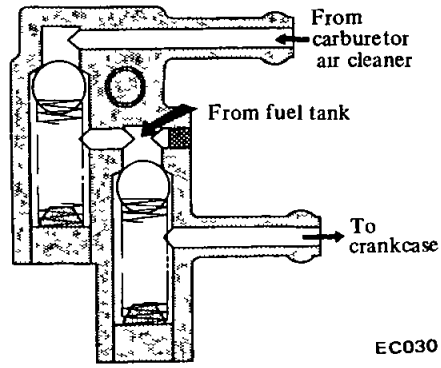
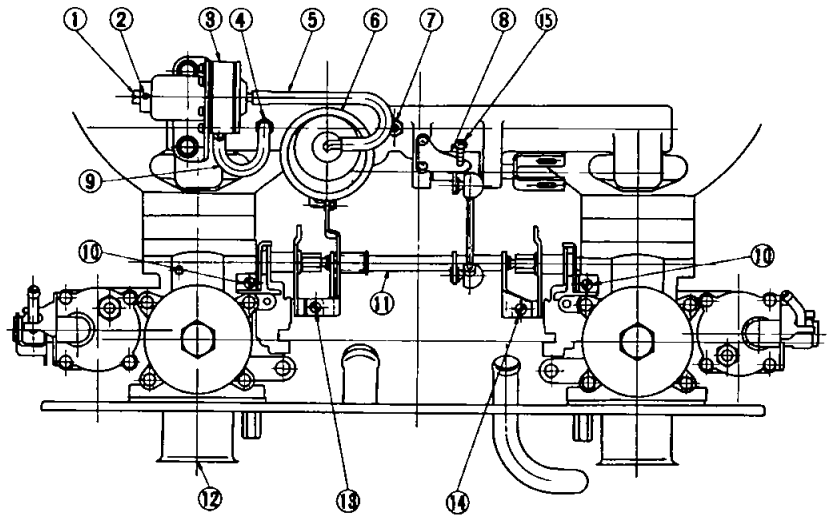


Fig EC-141 Flow guide valve

ADJUSTING ENGINE IDLING SPEED AND GAS MIXTURE



1 Vacuum adjusting screw
2 Lock screw
3 Control valve
4 Connector control valve
5 Vac tube-servo diaphragm
6 Servo diaphragm
7 Connector-A B valve
8 Auxiliary throttle shaft
9 Vac tube-control valve
10 Throttle adjusting screw
11 Throttle shaft
12 Air cleaner air horn
13 Opener adjusting screw
14 Balance screw
15 Fast idle setting screw EC079

Fig EC-142 Carburetor linkage

1 Remove the air cleaner cover and oil damper cap, raise the suction piston by finger, and make sure that the suction piston can be raised smoothly
2 Check oil level, and add oil (MS#20 or 10W-30) if insufficient

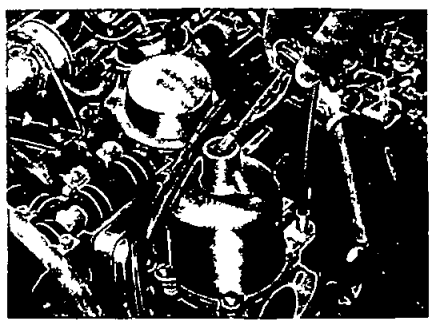


Fig EC-143 Checking damper oil level

3 Loosen the balance screw and the first idle setting screw completely

Note Make sure front (F) and rear (R) carburetors are disconnected.

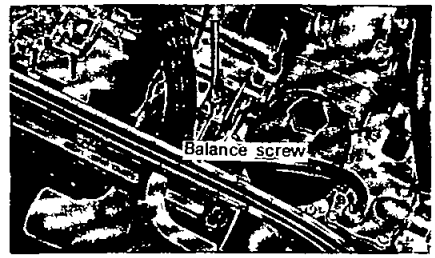


Fig EC-144 Loosening the balance screw

4 It is absolutely necessary to drive the vehicle for more than 20 minutes about 30 mph for warming up.

Note In this procedure, make sure that the HOT-COLD valve on the air cleaner intake nozzle is adjusted in accordance with the season in which the vehicle is driven (summer or winter side).

5 Connect the engine tachometer and the timing light
6 Adjust engine idling speed to 600 to 700 rpm, turning F and R throttle adjusting screws

Notes

a When the engine idling speed is being adjusted, do not touch fast idle setting screw, because this screw has already been adjusted at the factory

The engine speed becomes unstable during idling speed, unbalancing the operation between F and R carburetors, if adjusted by the fast idle setting screw.

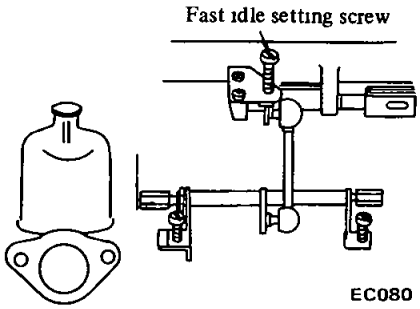


Fig EC-145 Fast idle setting screw

b Reduce engine idling speed to the extent that engine operates stably

c When throttle adjusting screws is turned clockwise, throttle valve opens.

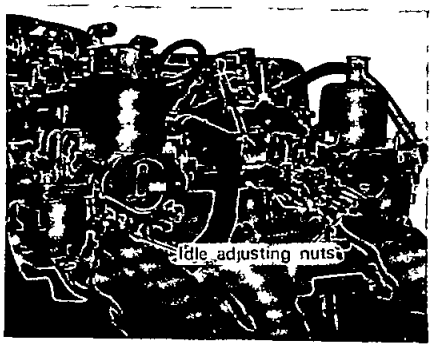


Fig EC-146 Idle adjust nuts

Fig EC-147 Throttle adjusting screw

	L24 engine standard idling speed
With manual transmission	750 rpm/ at 5°BTDC
Without automatic transmission	600 rpm/ at TDC

7 Apply a flow meter to the front side air horn ⑫ of the air cleaner, turn the air flow adjusting screw, align the upper end of the float in the glass tube to the scale

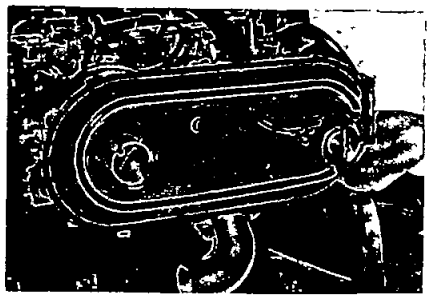


Fig. EC-148 Setting flow meter

Notes

a. Stand the flow meter float vertically.

b The flow meter is used to hinder the engine from intaking air, and therefore, it is recommended that the flow meter be used for a very short period of time (one to two seconds).
(It should not be used continuously.)

c. When adjusting in idling condition for 1 to 2 minutes or more, make sure to race the engine beforehand.

d. When the throttle adjusting screw is returned during the above adjustment and engine speed cannot be reduced below 750 rpm, other adjusting screws such as opener adjusting screw ⑬ and balance screw ⑭ must have been tightened excessively or the accelerator linkage must have been adjusted incorrectly. Under the normal condition, the auxiliary throttle shaft ⑧ and throttle shaft 11 should have a slight play during engine operation under the idling speed In other words, the auxiliary throttle shaft ⑧ should be provided with a play "θ" which corresponds to the clearance Ta = Tb as shown in Figure EC-149

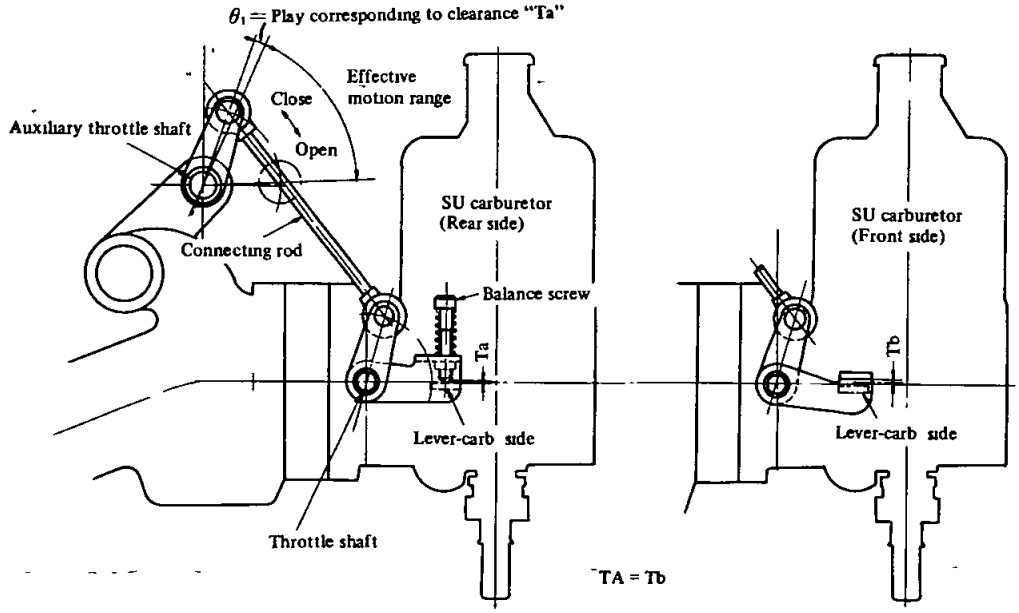


Fig EC-149 Adjusting idle speed and mixture

8 Then apply a flow meter to the rear side air horn ⑫ of the air cleaner (Do not move the air flow adjusting screw of the flow meter) If the flow meter float is not aligned with the front carburetor scale, turn the rear carburetor throttle adjusting screw and align the float with the front carburetor scale

Notes

a Do the same with the openings of F and R throttle valves

b The above throttle valve openings are even, and the air flow is also uniform when the position of the float in the glass tube of the flow meter stops at the same position for both F and R carburetors.

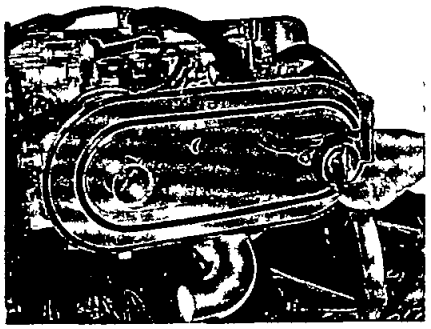


Fig EC-150 Setting flow meter

9 Adjust the ignition timing to 5° BTDC (With automatic transmission adjust it to TDC)

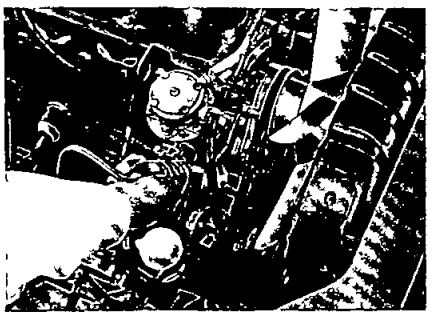


Fig. EC-151 Adjusting ignition timing

10 When the ignition timing is adjusted and engine speed is changed, repeat the adjustments described above in paragraph 7

11 Disconnect the control valve vacuum tube ⑨ from the control valve connector ④, and connect the servo diaphragm vacuum tube ⑤ to the control valve connector ④ (Apply manifold boost to the servo diaphragm ⑥) And then confirm that the engine idling speed is nearly 1,200 to 1,400 rpm

12 Use a flow meter and adjust the balance screw ⑭ properly so that the front and rear carburetor intake air volume is balanced

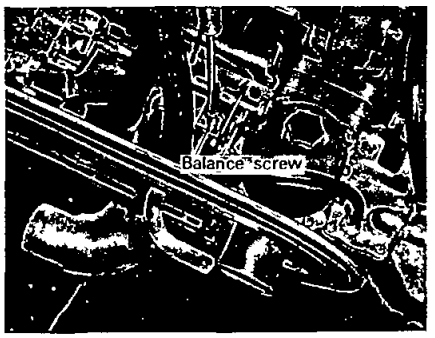


Fig EC-152 Balance screw

13 Adjust the opener adjusting screw ⑬ so that the engine speed is 1,400 rpm under the condition described above in paragraph 12

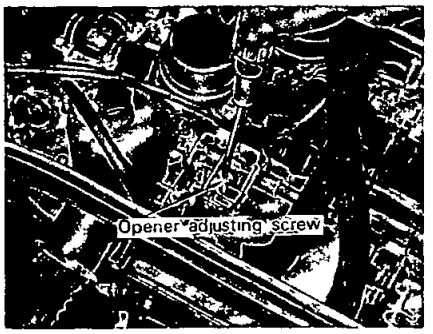


Fig EC-153 Opener adjusting screw

Note Before adjusting the engine speed, once race the engine at 3,000 rpm And raise again the engine speed to 1,700 rpm with opener adjusting screw, then gradually decrease the engine speed to 1,400 rpm

At the same time, it is important that CO level is strictly 1 0 to 1 6% (0 6 to 1 2% for automatic transmission models) by using CO meter, disconnecting the air pump discharge hose

If measured value is out of the specified level, equally turn in both front and rear idle adjusting nuts by turning them clockwise 1/8 turn at a time until the specified CO level is obtained

Note Each carburetor is properly adjusted for a proper air-fuel mixture ratio at factory.

14 Disconnect the servo diaphragm vacuum tube ⑨ once from the connector ④, reconnect the servo diaphragm vacuum tube ⑨ to the connector ④, and make sure that the engine speed is 1,400 rpm (Readjustment is described in paragraph 13 above, if the engine speed is not 1,400 rpm)

If the engine speed is in order, reconnect the servo diaphragm vacuum tube ⑨ to the control valve connector ④ and servo diaphragm vacuum tube to the original position

15 If CO meter is not available, adjust idling by turning the idle adjust nuts in the procedure as described in paragraph (1)

Avoid this measures, however, unless absolutely necessary

(1) Tighten idle rdjusting nuts of both F and R carburetors upward completely Then, loosen the above nuts with 3 turns

Note Nozzle head falls 0 04 inch from jet bridge with one return of idle adjusting nut

(2) Tighten the F and R idle adjusting nuts simultaneously by approximately 1/8 turn, and stop the nuts at the point where engine speed is the fastest and stablest The number of returns of idle adjust nuts in best condition is approximately 2 ½

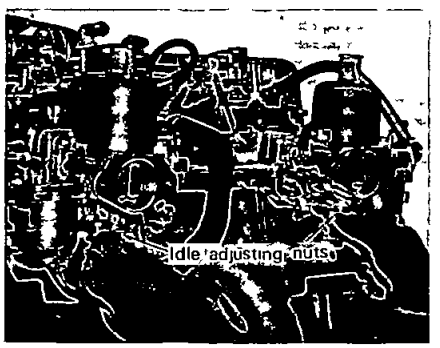


Fig EC-154 Idle adjust nuts

16 Lastly, use a flow meter again to see whether the front and rear carburetor air flow volumes are equal, and also ascertain that the idling speed is adjusted to the specified rpm

TROUBLE DIAGNOSES AND CORRECTIONS

CONTENTS

EXHAUST EMISSION CONTROL SYSTEM EC-74
Air pump EC-75

EXHAUST EMISSION CONTROL SYSTEM

A preliminary "Diagnosis Guide" is included below as an aid in trouble shooting the exhaust emission control system

Trouble	Probable cause
Excessive backfire in exhaust system	Anti-backfire valve vacuum line collapsed, clogged, disconnected or leaking Defect or malfunction of the anti-backfire valve resulting in insufficient air delivery to the intake manifold or insufficient duration time to the engine requirement Incorrect idle mixture adjustment Defect or malfunction of the spark plug or high tension cables
Air supply hose baked	Defective check valve on air distribution manifold
Rough engine idle	Incorrect carburetor adjustment of idle speed, idle mixture, choke setting Incorrect basic ignition timing Leak of vacuum at the anti-backfire valve vacuum line or air inlet hose Defective or sticked anti-backfire valve
Engine surges at all speed	Defective or sticked anti-backfire valve Incorrect carburetor adjustment of idle speed, idle mixture, choke setting

Trouble	Probable cause
Engine stop	Incorrect carburetor adjustment of idle speed, idle mixture, choke setting Incorrect basic timing Disconnection of vacuum tube of the anti-backfire valve
Noisy air pump drive belt	Drive belt improperly adjusted Seized or failing air pump Misaligned or defective pulley

Air pump

When mounted on the vehicle

Noise—external cause

The air injection pump is not completely noiseless Under normal conditions, noise rises in pitch as engine speed increases

If excessive noise is heard,

1 Make sure that the pump rotates correctly, and check the belt for proper tension

2 Check hoses for tightness, leaking or touching with other parts

3 Check the pump mounting bracket and the air cleaner for secure installation

4 Check relief valve for escaping air

Noise—internal cause

1 Vane noise

A "chirping" or "squeaking" noise is most commonly associated with vanes rubbing in housing bore Vane chirping is most noticeable at low speed and is heard intermittently Additional wear-in time may eliminate this condition If additional wear-in time does not eliminate chirp, the pump must be disassembled, and the vane and carbon shoes should be replaced

2 Bearing noise

A rolling sound indicates bearing noise This sound will be noticeable at all speeds, but does not necessarily indicate bearing failure However, if noise increases to an objectionable level, the bearing may have to be replaced

3 Rear bearing noise

This noise is identified by a continuous knocking sound When this noise occurs dismount the pump from the vehicle and inspect carefully

Off car

1 With the pump removed from the vehicle, rotate drive hub in jerks three-quarters of one full turn forward and one-quarter of one full turn backward If roughness or bumps are felt, remove the rear cover

2 Inspect carbon seal This seal should not have any holes caused by wear or be broken or cracked Such condition commonly results from defective rear and/or vane bearing A failed seal must be replaced

3 With rear rotor ring and carbon seal removed, pull out the vanes Vane bearing failure is also indicated by absence of grease or caked grease Inspect vane shaft to confirm this bearing failure All corners of vanes should be square When edges are broken, replace the vanes

4 Remove carbon shoes and inspect surface contacting with the vane Small grooves in shoes are normal Replace, if chipped or broken Broken shoes indicate improper assembly of shoe springs Damaged shoes must be replaced and springs must be properly installed

5 Carbon dust may be present on vanes and in housing This is an indication of normal wear Remove carbon dust by blowing compressed air to the parts in question

Condition	Probable cause	Corrective action
Inoperative pump	Trouble in pump	Replace with new pump
	Excessive slackness of drive belt	Adjust drive belt tension to specified value
Insufficient delivering air	Damaged vane hub bearing	Replace
	Worn vane	Replace
	Worn carbon shoe	Replace
	Worn side seal	Replace

Condition	Probable cause	Corrective action
Air leakage	Leakage from hoses, connectors or clamps	Repair or tighten Replace if necessary
	Leakage from relief valve	Replace relief valve
Abnormal noise	Stick of air pump	Replace with new assembly
	Slackness of drive belt (in accelerating)	Adjust drive belt tension
	Leakage from hoses, connectors or clamps	Retighten or replace

SERVICE MANUAL

EMISSION CONTROL SYSTEM

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION SE

SERVICE EQUIPMENT

SE

RECOMMENDED PERIODICAL MAINTENANCE	EC-78
SERVICE DATA	EC-79
SERVICE TOOL	EC-90

RECOMMENDED PERIODICAL MAINTENANCE

	Item	Interval	miles
1	Engine		
	Check and adjust ignition timing	every	3,000
	Engine tune-up		12,000
	Check spark plugs		3,000
	Replace spark plugs		12,000
	Check high tension cables		12,000
	Check distributor breaker points		3,000
	Replace distributor breaker points		12,000
	Grease distributor cam and cam heel		6,000
	Replace carburetor air cleaner element		24,000
2	Crankcase Emission Control		
	Check hoses and piping connections for looseness and clog		12,000
	Check ventilation control valve for operation		12,000
	Replace ventilation control valve		24,000
3	Exhaust Emission Control		
	Check throttle opener setting (throttle valve opening position and vacuum)	first	600
		every	12,000
	Check transmission controlled vacuum advance		12,000
	Check automatic temperature control air cleaner		12,000
	Check electrical switches of emission control system for operation		12,000
	Check boost control deceleration device for operation (B C D D)	first	600
		every	3,000
	Adjust boost control deceleration device for operation (B C D D)		12,000
	Check spark timing control system for operation		12,000
	Check air pump drive belt for tension and wear (240Z only)		12,000
	Check air pump for operation (240Z only)		12,000
4	Evaporative Emission Control		
	Check hoses, hose connectors and pipings for leaks		12,000
	Check flow guide valve for proper function		12,000

SERVICE DATA

Item \ Model		LB110TRU		KLB110U	LB110ARU	KLB110AU
Engine model		A12		←	←	←
Number of cylinders		4, in line		←	←	←
Type of cylinder head		O H V		←	←	←
Displacement x bore x stroke cu in x in x in		71 5 x 2 874 x 2 756		←	←	←
Nominal compression ratio		8 5 to 1		←	←	←
Recommended fuel grade		Regular		←	←	←
Transmission type		F4W56L		←	3N71B	←
	1st	3 757		←	2 458	←
	2nd	2 169		←	1 458	←
	3rd	1 404		←	(TOP) 1 000	←
	4th	1 000		←	–	–
	Rev	3 640		←	2 182	←
Final gear ratio		3 900		←	←	←
Curb weight	lb	1,585		1,605	1,660	1,680
Type of crankcase emission control		Closed type		←	←	←
Type of exhaust emission control		Engine modification system		←	←	←
Carburetor						
Make		HITACHI		←	←	←
Model		DCH306-1A DCH306-1		←	DCH306-3A DCH306-3	←
Type		Downdraft dual throat		←	←	←
Barrel		Primary	Secondary	←	←	←
Bore	in dia	1 024	1 181	←	←	←
Large venturi	in dia.	0 787	1 024	←	←	←
Small venturi	1st in dia	0 315	0 276	←	←	←
	2nd in dia.	–	0 512	←	←	←
Main jet		#97	#140	←	←	←
Main air bleed		#80	# 80	←	←	←
Slow jet		#43	# 50	←	←	←

Item \ Model	LB110TRU	KLB110U	LB110ARU	KLB110AU
Slow air bleed	#215 / #100	←	←	←
Power jet	#45 (-1A, -3A) #50 (-1, -3)	←	←	←
Accelerator pump injector in dia	0 02	←	←	←
Injection volume cu in	0 037	←	←	←
Dumper spring oz	35 2	←	←	←
Choke	Electric automatic choke	←	←	←
Throttle opening at full choke	17°	←	20°	←
Dashpot	X	X	X	X
Alternator				
Make	HITACHI	←	←	←
Model	LT135-13	←	←	←
Capacity V-A	12-35	←	←	←
Distributor				
Make	HITACHI	←	←	←
Model	D412-80	←	D412-63	←
Condenser μF	0 22	←	←	←
Spark plug				
Make	NGK / HITACHI	←	←	←
Model	BP-5ES / L46PW	←	←	←
Flow guide valve				
Make	HITACHI	←	←	←
Model	FGA-1	←	←	←
Opening pressure in Hg	0 4	←	←	←
Control valve				
Make	HITACHI	←	←	←
Model	TPA28-I	←	TPA28-3	←
Opening depression (at sea level) in Hg	22 2 to 22 8	←	21 5 to 22 0	←
Servo diaphragm				
Full stroke in	0.1969	←	←	←

Mark "X" means available

Item \ Model	LB110TRU	KLB110U	LB110ARU	KLB110AU
Opening stroke	1700 to 1800 rpm of engine speed on no load	←	←	←
Transmission controlled vacuum advance	Vacuum advance only in 4th gear	←	—	—
Temp sensing switch	Above 50°F ON	←	—	—
Tune up data				
Basic timing °BTDC/rpm	5/700	←	←	←
Idling speed rpm	700	←	600 in drive range	←
CO Percent setting %	2 0	←	←	←
Distributor dwell angle	49° to 55° at 0 02 inch of point gap	←	←	←
Spark plug gap in	0 0315 to 0 0355	←	←	←

Item \ Model	PL510TU	RPL510TU	PL510AU	RPL510AU	WPL510TU	WPL510AU
Engine model	L16	←	←	←	←	←
Number of cylinders	4, in line	←	←	←	←	←
Type of cylinder head	S O H C	←	←	←	←	←
Displacement x bore x stroke cu in x in x in	97 4 x 3 268 x 2 902	←	←	←	←	←
Nominal compression ratio	8 5 to 1	←	←	←	←	←
Recommended fuel grade	Regular	←	←	←	←	←
Transmission type	F4W63L	←	3N71B	←	F4W63L	3N71B
1st	3 382	←	2 458	←	3 657	2 458
2nd	2 013	←	1 458	←	2 177	1 458
3rd	1 312	←	1 000	←	1 419	1 000
4th	1 000	←	–	–	1 000	–
Rev	3 364	←	2 182	←	3 638	2 182
Final gear ratio	3 900	←	←	←	←	3 889
Curb weight lb	2,149	2,105	2,205	2,160	2,260	2,315
Type of crankcase emission control	Closed type	←	←	←	←	←
Type of exhaust emission control	Engine modification system	←	←	←	←	←
Carburetor						
Make	HITACHI	←	←	←	←	←
Model	DAH328-2A	←	DAH328-1A	←	DAH328-2A	DAH328-1A
Type	Down draft dual throat	←	←	←	←	←
Barrel	2	←	←	←	←	←
Bore in dia	Primary 1 102 / Secondary 1 260	←	←	←	←	←
Large venturi in dia	0 906 / 1 102	←	←	←	←	←
Small venturi 1st in dia	– / 0 354	←	←	←	←	←
2nd in dia	– / –	←	←	←	←	←
Main jet	#112 / #155	←	←	←	←	←
Main air bleed	#240 / #120	←	←	←	←	←
Slow jet	# 48 / #180	←	←	←	←	←
Slow air bleed	#150 / #100	←	#130 / #100	←	#150 / #100	#130 / #100

Item \ Model	PL510TU	RPL510TU	PL510AU	RPL510AU	WPL510TU	WPL510AU
Power jet	#50	←	←	←	←	←
Injection volume cu in	0 03	←	←	←	←	←
Dumper spring oz	26 5	←	←	←	←	←
Vacuum jet	#150 / #130	←	←	←	←	←
Choke spring	Electric atuo-matic choke	←	←	←	←	←
Fast idle	15°	←	17°	←	15°	17°
Alternator						
Make	HITACHI	←	←	←	←	←
Model	LT135-13 (LT150-05)	←	←	←	←	←
Capacity	12V-35A (12V-50A)	←	←	←	←	←
Distributor						
Make	HITACHI	←	←	←	←	←
Model	D412-81 D412-84 from Oct off-line	←	←	←	←	←
Condenser μF	0 22 (Advance) 0 05 (Retard)	←	←	←	←	←
Spark plug						
Make	NGK / HITACHI	←	←	←	←	←
Model	BP-5ES / L46PW	←	←	←	←	←
Flow guide valve						
Make	HITACHI	←	←	←	←	←
Model	FGA-2	←	←	←	←	←
Opening pressure in Hg	0 394	←	←	←	←	←
Spark timing control system						
Speed switch	–	–	Over 13 mph ON	←	–	Over 13 mph ON
Third gear switch	Third gear ON	←	–	–	Third gear ON	–
Throttle switch position	3 to 30° ON under 3° or above 30° OFF	←	←	←	←	←
Temp sensing switch	above 50°F ON under 34°F OFF	←	←	←	←	←

Item \ Model	PL510TU	RPL510TU	PL510AU	RPL510AU	WPL510TU	WPL510AU
Tune up data						
Basic timing	7° BTDC	←	←	←	←	←
Idling speed	700 rpm	←	600 rpm in drive	←	700 rpm	600 rpm in drive
CO percent setting %	2 0	←	←	←	←	←
Distributor dwell angle	49 to 55° at point gap 0 0197 in	←	←	←	←	←
Spark plug gap in	0 0315 to 0 0355	←	←	←	←	←

Item \ Model			PL521TU	PL521TUH
Engine model			L16	←
Number of cylinders			4, in line	←
Type of cylinder head			S O H C	←
Displacement x bore x stroke		cu in x in x in	97 4 x 3 268 x 2 902	←
Nominal compression ratio			8 5 to 1	←
Recommended fuel grade			Regular	←
Transmission type			F4W63	←
	1st		3 657	←
	2nd		2 177	←
	3rd		1 419	←
	4th		1 000	←
	Rev		3 638	←
Final gear ratio			4 375	←
Curb weight		lb	2,200	2,190
Type of crankcase emission control			Closed type	←
Type of exhaust emission control			Engine modification system	←
Carburetor				
Make			HITACHI	←
Model			DAH328-3B	←
Type			Down draft, Dual throat	←
Barrel			2	←
Bore		in dia	Primary: 1 102 / Secondary: 1 260	←
Large venturi		in dia	0 906	1 102	←
Small venturi	1st	in dia	–	0 3543	←
	2nd	in dia	–	–	←
Main jet			#112	#155	←
Main air bleed			#240	#120	←
Slow jet			# 48	#180	←
Slow air bleed			#150	#100	←

Item \ Model		PL521TU		PL521TUH
Power jet		#50		←
Injection volume	cu in	0 03		←
Dumper spring	oz	26 5		←
Vacuum jet		#150	#130	←
Choke		Electric automatic choke		←
Fast idle		15°		←
Alternator				
Make		HITACHI		←
Model		LT135-13		←
Capacity		12V 35A		←
Distributor				
Make		HITACHI		←
Model		D412-81 D412-84 from Oct. off-line		←
Condenser	μF	0 22 (Advance) 0 05 (Retard)		←
Spark plug				
Make		NGK	HITACHI	←
Model		BP-5ES	L46PW	←
Flow guide valve				
Make		HITACHI		←
Model		FGA-1		←
Opening pressure	in Hg	0 394		←
Spark timing control system				
Third gear switch		Third gear ON		←
Throttle switch position		3 to 40° ON under 3° or above 40° OFF		←
Temp sensing switch		Above 50°F ON under 34°F OFF		←
Tune up data				
Basic timing		7° B T D C		←
Idling speed	rpm	700		←
CO percent setting	%	2		←
Distributor dwell angle		49° to 55° 0 0197 in of point gap		←
Spark plug gap	in	0 0315 to 0 0354		←

Item \ Model		HLS30-U	HLS30-AU
Engine model		L24	←
Number of cylinders		6, in line	←
Type of cylinder head		S O H C	←
Displacement x bore x stroke	cu in x in x in	146 x 3 268 x 2 902	←
Nominal compression ratio		8 8 to 1	←
Recommended fuel grade		Regular	←
Transmission type		F4W71B	3N71B
	1st	3 549	2 458
	2nd	2 197	1 458
	3rd	1 420	1.000
	4th	1 000	–
	Rev	3 164	2 182
Final gear ratio		3.364	3 545
Curb weight	lb	2,300	2,360
Type of crankcase emission control		Closed type	←
Type of exhaust emission control		Air injection with engine modification	←
Carburetor			
Make		HITACHI	←
Model		HJG 46W-8	HJG 46W-9
Type		SU type Side draft	←
Bore	in dia	1 811	←
Suction piston lift	in dia	1 339	←
Jet	in dia	0 100	←
Metering needle		N-58	←
Suction spring		#23	←
VC hole		from front carburetor	←
Fast idle (throttle opening at full choke)		6°	7°

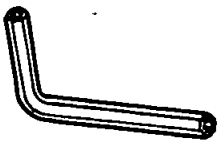
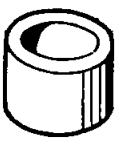
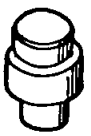
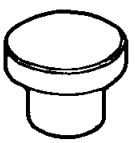
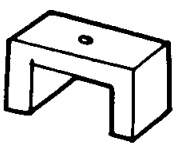
Item \ Model		HLS30-U		HLS30-AU
Alternator				
Make		HITACHI		←
Model		LT150-05		←
Capacity		12V-50A		←
Distributor				
Make		HITACH		←
Model		D612-53		D614-52
Condenser	μF	0.22		0 22 (Advance) 0 05 (Retard)
Spark plug				
Make		NGK	HITACHI	←
Model		BP-6ES	L45PW	←
Air pump				
Make		HITACHI		←
Model		ECP-200-3		←
Capacity	cu in/Rev	12 2		←
Pulley ratio		0 93		←
Anti-backfire valve				
Make		HITACHI		←
Type		Gulp type		←
Model		AV54-1B		←
Duration time		1 5 to 1 9 sec at 19 7 in Hg Pressure difference		←
Check valve				
Make		HITACHI		←
Model		CV27-2		←
Opening pressure	in Hg	0.1496		
Flow guide valve				
Make		HITACHI		←
Model		FGA-3		←
Opening pressure	in Hg	0 4		←

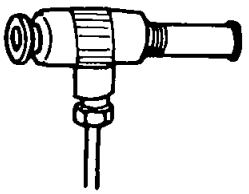
Item \ Model		HLS30-U	HLS30-AU
Control valve			
Make		HITACHI	←
Model		TPA28-2	TPA28-4
Opening negative pressure	in Hg	20 5	19 3
Bellows outer diameter	in dia.	1 024	←
Servo diaphragm			
Full stroke	in dia	0 1969	←
Type		SD46-1	←
Tune up data			
Basic timing	°/rpm	5/750	0/600
Idling speed	rpm	750	600 in drive
CO percent setting (with air pump disconnected)	%	6 or below	←
Distributor dwell angle		35° to 41°	33° to 39°
Spark plug gap	in	0 0315 to 0 0354	←

SERVICE TOOL

Special tools necessary to perform recommended emission control maintenance are as follows

Special tools for air injection pump

Tool number (Former tool number) Tool name	Figure	Description	Applied model	S M reference page (See Fig No)
ST19810000 (STECP20000) Hexagon wrench		For removing and installing the rotor ring assembly	L24	Page EC-58 (Fig EC-116)
ST19820000 (STECP20001) Support for disassembling rotor ring		For supporting the rotor ring in case of needle bearing removal and installation	L24	Page EC-58 (Fig EC-117)
ST19830000 (STECP20002) Attachment for pushing out needle bearing		For removing the needle bearing	L24	Page EC-58 (Fig EC-117)
ST19840000 (STECP20003) Attachment for pressing in needle bearing		For installing the needle bearing	L24	Page EC-60
ST19850000 (STECP20004) Bridge for pulling out relief valve		Use as a bridge for removing the relief valve by the puller	L24	Page EC-58 (Fig EC-119)

Tool number (Former tool number) Tool name	Figure	Description	Applied model	S M reference page (See Fig No)
ST19860000 (STECP20005) Dummy shaft		For assembling the vanes	L24	Page EC-59 (Fig EC-121)
ST19870000 (STECP20006) Air pump test gauge adaptor		For checking the air pump performance	L24	Page EC-67

* The special tools for A12 and L16 engines are not available as emission control maintenance

Other necessary tester

1 Carburetor balancer
2 Engine exhaust combustion analyzer
3 Ignition analyzer oscilloscope
4 Distributor advance tester
5 Ignition timing light
6 Tachometer
7 Pressure gauge
8 Vacuum gauge
9 Ammeter
10 Voltmeter
11 Ohmmeter
12 Compression tester
13 Cam angle dwell meter
14 Thermister

SERVICE JOURNAL OR BULLETIN REFERENCE

DATE	JOURNAL or BULLETIN No	PAGE No	SUBJECT

SERVICE JOURNAL OR BULLETIN REFERENCE

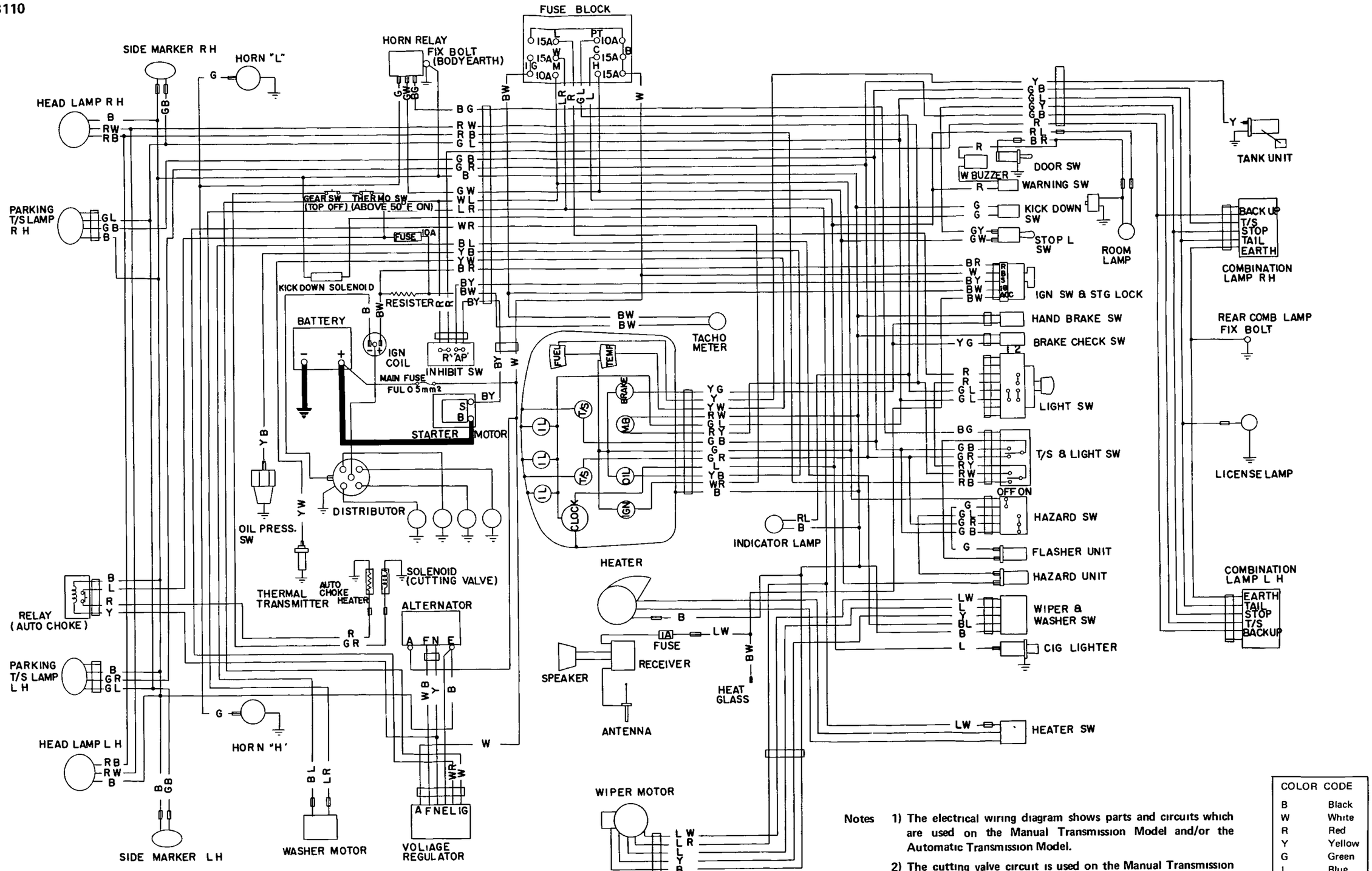
DATE	JOURNAL or BULLETIN No	PAGE No	SUBJECT

SERVICE JOURNAL OR BULLETIN REFERENCE

DATE	JOURNAL or BULLETIN No	PAGE No	SUBJECT

WIRING DIAGRAM

MODEL LB110

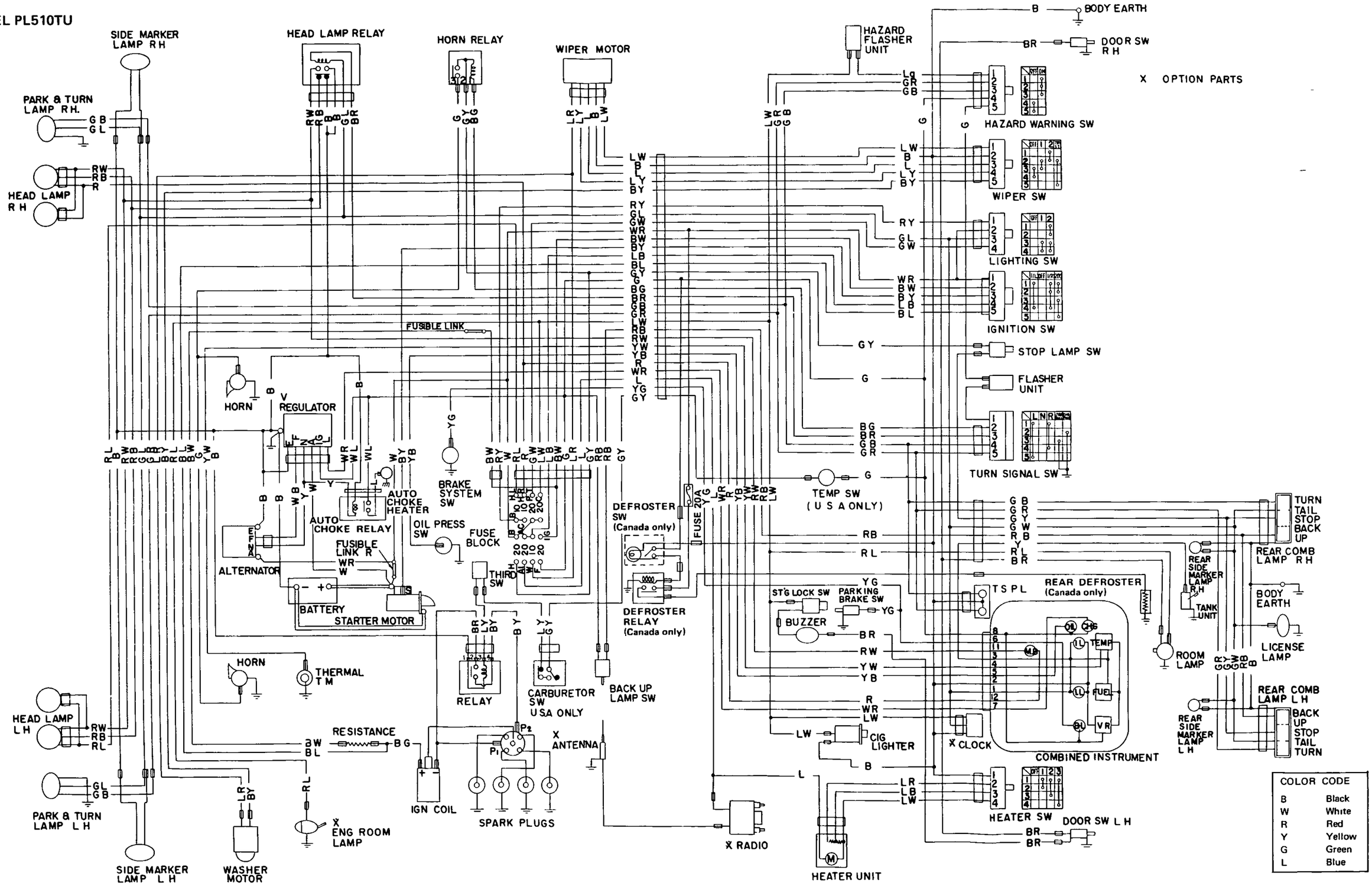


COLOR CODE	
B	Black
W	White
R	Red
Y	Yellow
G	Green
L	Blue

Notes
1) The electrical wiring diagram shows parts and circuits which are used on the Manual Transmission Model and/or the Automatic Transmission Model.
2) The cutting valve circuit is used on the Manual Transmission Model only.

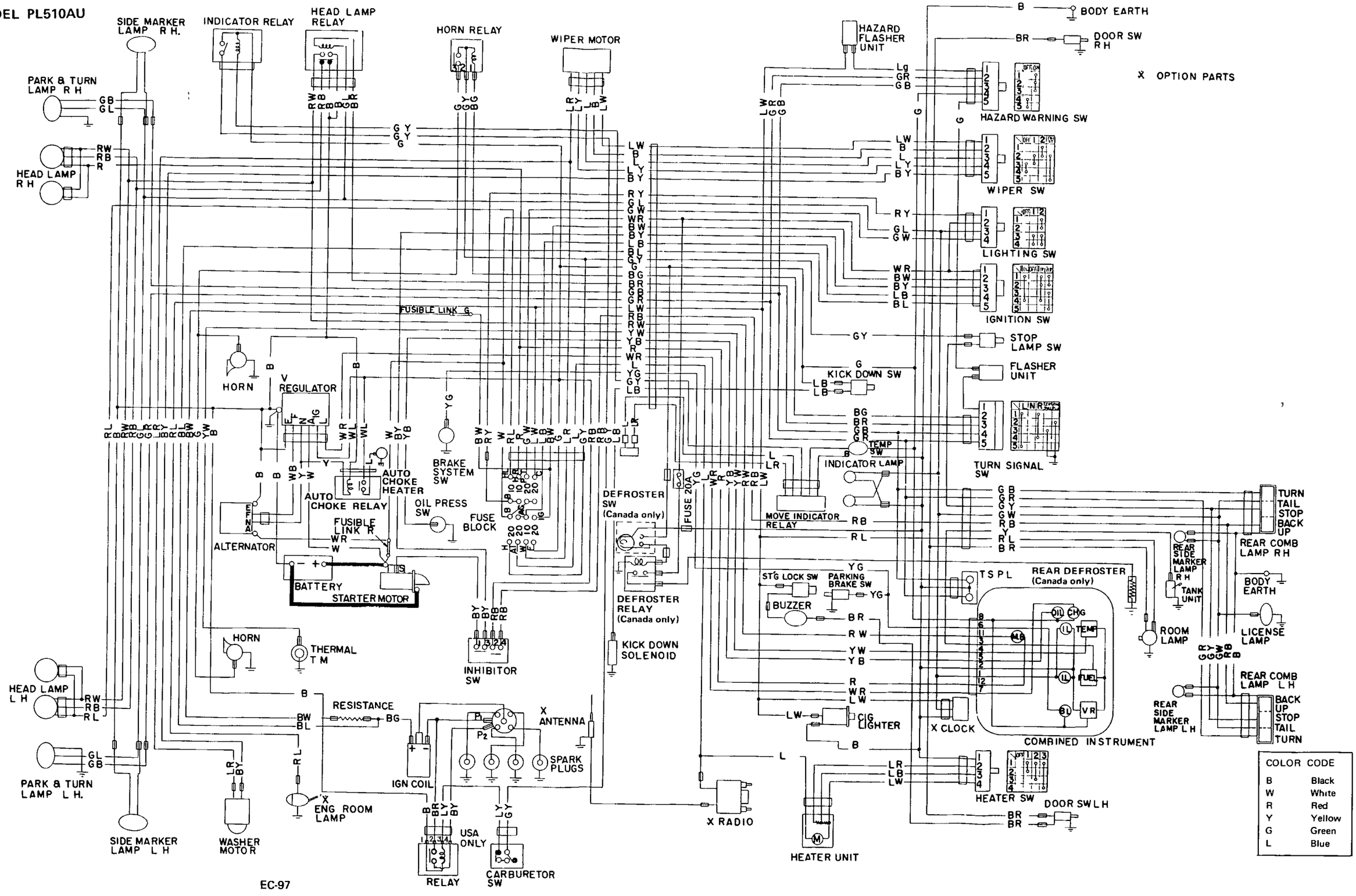
WIRING DIAGRAM

MODEL PL510TU



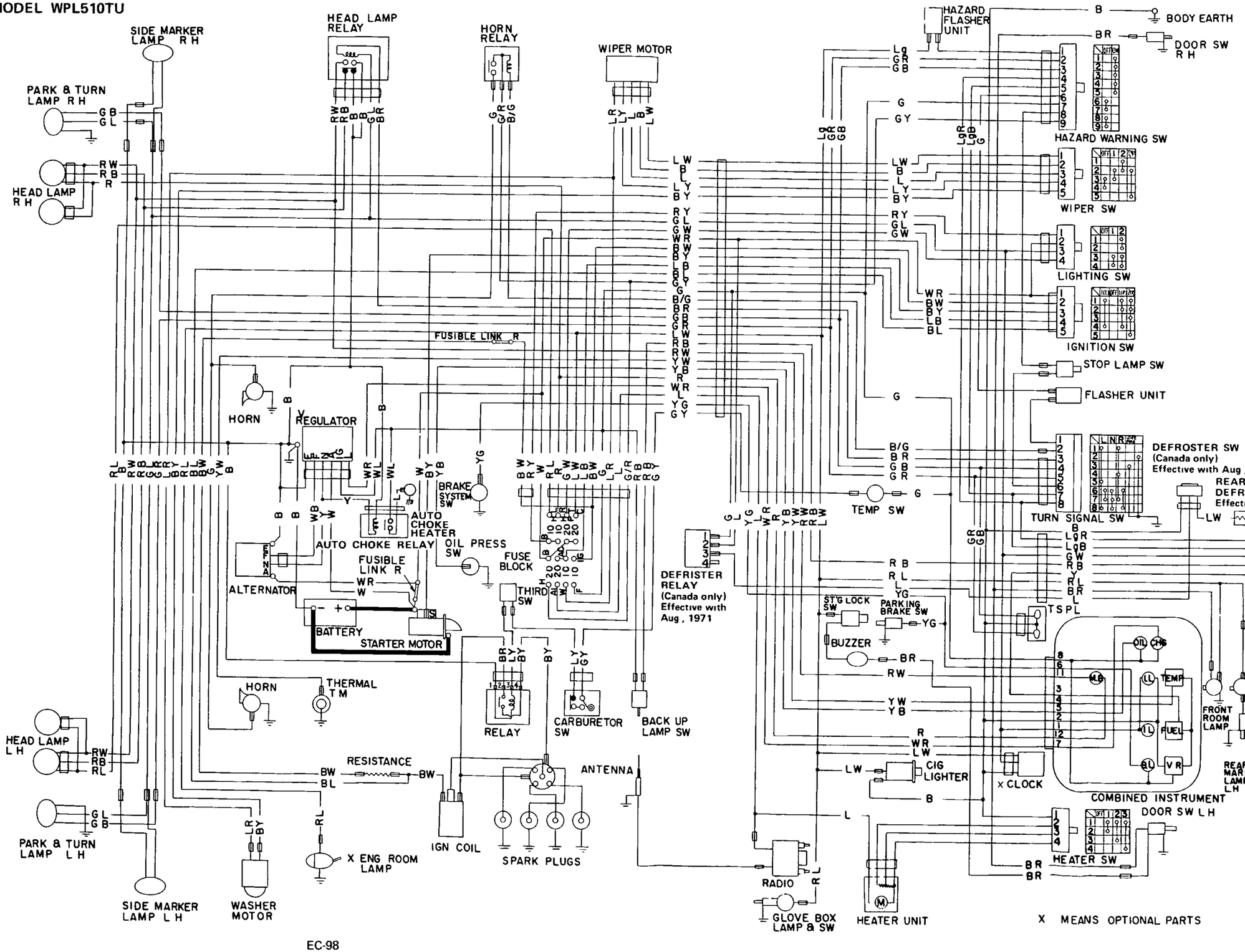
WIRING DIAGRAM

MODEL PL510AU



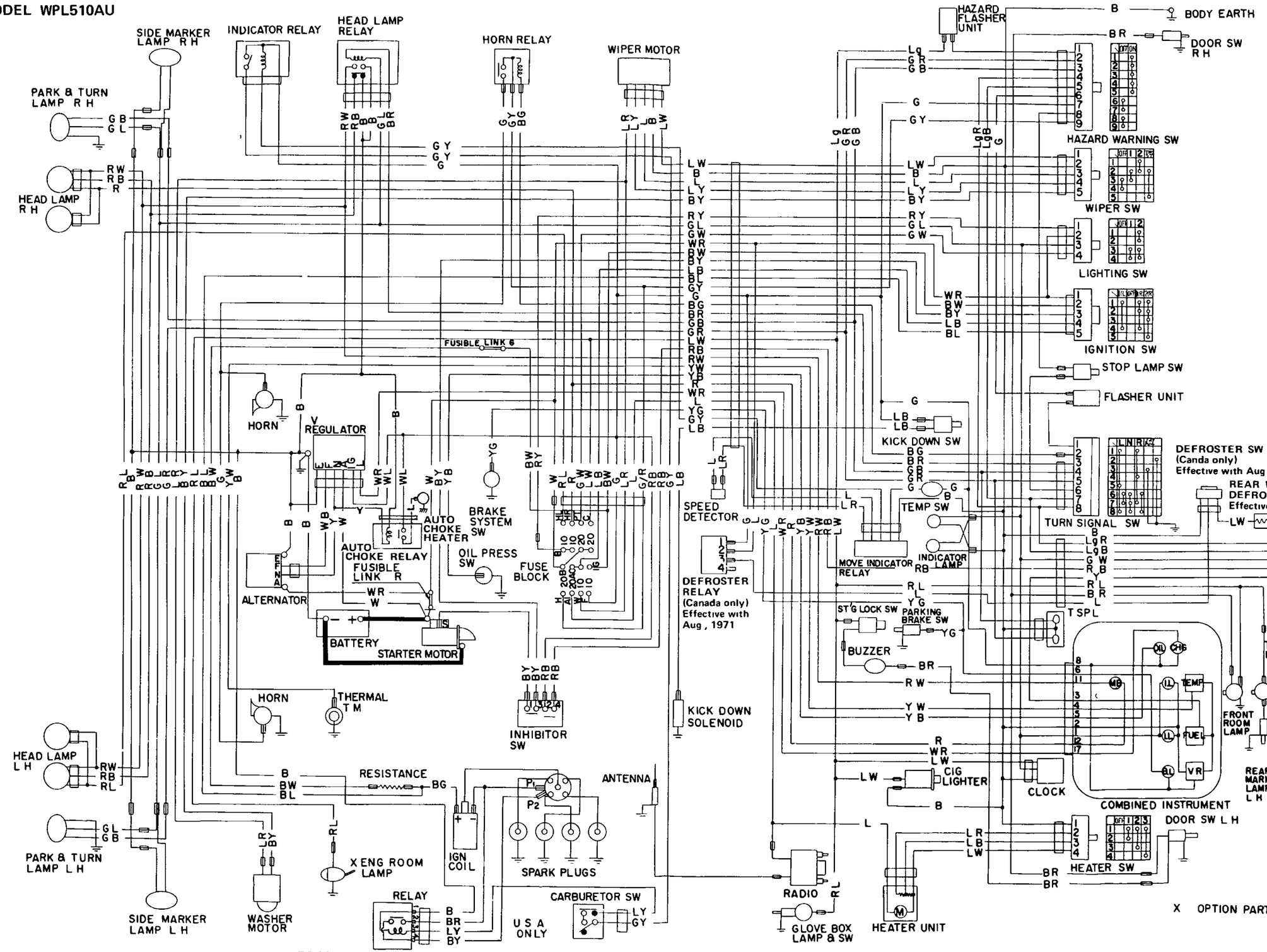
WIRING DIAGRAM

MODEL WPL510TU



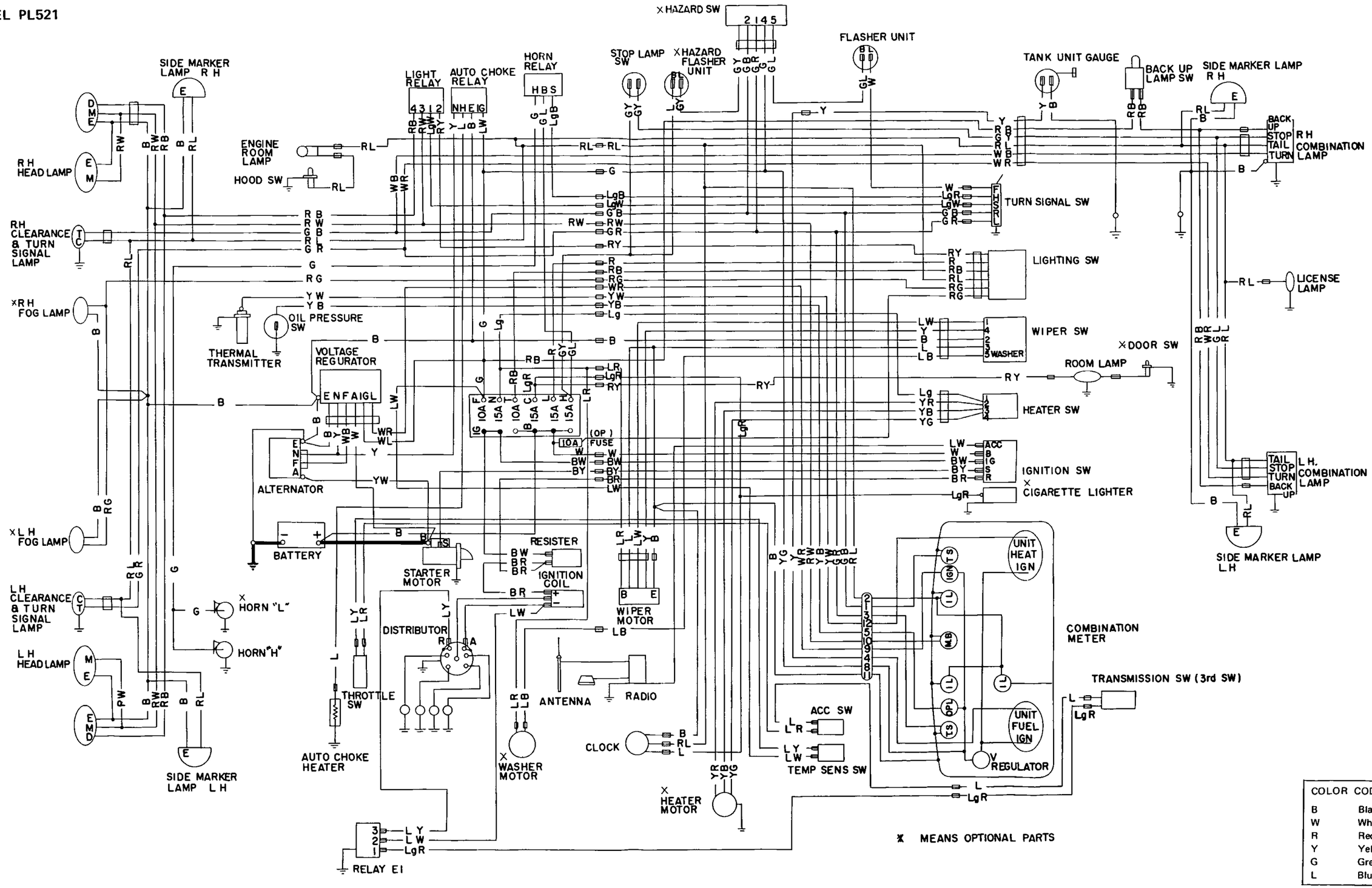
WIRING DIAGRAM

MODEL WPL510AU



WIRING DIAGRAM

MODEL PL521



COLOR CODE	
B	Black
W	White
R	Red
Y	Yellow
G	Green
L	Blue

× MEANS OPTIONAL PARTS

WIRING DIAGRAM

MODEL S30